Chapter I

INTRODUCTION

The identification of physical characteristics in a sport modality contributes to its success and enables to spot differences among athletes of different modalities, which is of great interest for both sport coaches and scientists.

Sports performance is based in a complex and intricate diversity of variables, which include physical (general and specific conditions), psychological (personality and motivation) and body (body morphology, anthropometry and body composition) factors. The relationship between morphological variables and sports performance is the object of study of anthropometry and is an important element to be analyzed.

Anthropometry is the measurement of body size and proportions. The measurements include body weight, height, circumference, skin fold thickness and bony widths and lengths (Heyward, 2006). Anthropometry is a branch of science concerned with comparative measurements of the human body, its parts, and its proportions and composition. It is the study of measurement of the human body in terms of the dimensions of bone, muscle and adipose tissue. Anthropometry has been used to assess gross structure and function. There are numerous factors which are responsible for the performance of a sportsman. The physique and body composition, including the size, shape and form are known to play a significant role in this regard. At present, sportsman for superior performance in any sports is selected on the basis of physical
structure and body size. Anthropometric measurements are widely used to assess and predict performance in various sports.

Anthropometric measurements and morphological characteristics play an important role in determining the success of a sportsperson (Wilmore & Costill, 1999; Keogh, 1999). An athlete’s anthropometric and physical characteristics may represent important prerequisites for successful participation in any given sport (Gualdi-Russo & Zaccagni, 2001). Indeed, it can be assumed that an athlete’s anthropometric characteristics can in some way influence his/her level of performance, at the same time helping to determine a suitable physique for a certain sport (Carter & Heath, 1990). It has been well established that specific physical characteristics or anthropometric profiles indicate whether the player would be suitable for the competition at the highest level in a specific sport (Claessens et al., 1999; Reilly et al., 2000; Gabbett, 2000; Slater et al., 2005). Therefore, it is of practical relevance and importance to identify those skeletal characteristics that will favor a specific sport. The changeable (body composition) and unchangeable (skeletal size, shape and proportion) anthropometric characteristics predisposing to success will differ from sport to sport. Bale (1986) suggested that size, shape and body composition play an important part in providing distinct advantage for specific playing positions, especially at elite level of competition where there is a high degree of player specialization. This suggests that the anthropometric characteristics for success may not only differ from sport to sport, but also within different playing positions in team sports. The knowledge of anthropometric characteristics also allows the
athlete and the coach to make adaptations to his/her training regime to attain the optimal physical attributes for best performance. In fact, the information regarding the anthropometric status of an athlete is essential for two main reasons, firstly, to design an effective training program and secondly to select the event-specific talents in the players. Some anthropometric characteristics, e.g. length and breadth measurements, are genetically determined and can hardly be changed with the effects of a training program. Various anthropometric measurements were found to be closely associated with excellent performance in volleyball. Composition of athlete’s body is also most important factor in the success of a team in all athletic endeavors (Wilmore, 1982). Body composition plays an important role in achieving excellence in sports performance (Mathur & Salokun, 1985). Body composition refers to the characterization of body weight in terms of absolute and relative amounts of fat mass and fat-free mass. It is the relative percentage of muscles, fat, bone, and other tissues of the body (Kirk et al., 2008). Body composition is an important determining factor for performance ability of an athlete. Fat free body weight also known as the lean body mass, and the fat mass is the total amount of essential and storage fat in the body (Thygerson & Thygerson, 2009).

Body composition of players is an important tool to evaluate the health of the players, to monitor the effects of a training program and to determine optimal competitive body weight and other components of body composition (Prior et al, 2001). Body composition, specifically body fat percentage is of
great interest to athletes and is often negatively associated with athletic performance (Gomez, 2004; Malina, 2007; Sigurbjorn et al., 2000).

Excess body fat is detrimental to performance in most sports whereas, fat free mass, especially muscle mass, is generally associated with performance. Body composition also makes an important contribution to an individual’s level of physical fitness for performance, particularly in such sports that require one to carry one’s body weight over a distance, which is facilitated by a large proportion of active tissue (muscle) in relation to a small proportion of fat tissue (Jain, 2004). The appraisal of body composition can provide valuable information for both the athlete and coach in monitoring sequentially the influences of training and nutrition. Therefore, the determination of body composition is important in terms of a training plan as well as success in the game (Kurt et al, 2010).

The game is characterized by a great intermittent exercise, notably with the use of both aerobic and anaerobic energy metabolism. However, it is suggested that the prevailing energy demand in a rally is the alactic anaerobic metabolism. Concerning badminton athletes’ physical characteristics, several factors contribute to the success in the sport, including technique and tactics, psychological preparation and game strategy (Chint et al., 1995).

Wonisch et al. (2003) highlight it is a sport modality which requires both aerobic and anaerobic energy systems and such characteristic is directly related to both short and long rallies, as well as game duration. Badminton
athletes must have great physical capacity, especially speed and aerobic strength and power.

Specific anthropometric characteristics are needed to be successful in certain sporting events. It is also important to note that there are some differences in body structure and composition of sports persons involved in individual and team sports. The tasks in some events, such as shot put or high jump, are quite specific and different from each other and so are the successful physiques. This process whereby the physical demands of a sport lead to selection of body types best suited to that sport is known as “morphological optimization” (Bloomfield et al., 1995).

Track and field events are marked by an exceptional variety of duration of a single event, energetic demands and the tempo of energy release. The fact that runners need to carry their body weight, which means they need to overcome the force of gravity on different distances, stipulates a specific (lean) body composition as a prerequisite for more efficient and economic performance in a single event. Athletes who have (or) acquired the optimal physique for a particular event are more likely to succeed than those who lack the general characteristics (Carter, 1984).

Studies on somatotype of athletes, elite athletes and Olympic athletes have generally shown that strength and speed dependent athletes tended to be basically mesomorphic while distance dependant athletes were found to be more ectomorphic with limited amount of mesomorphic muscularity (Battinelli, 2000).
A somatotype is a description of present morphological confirmation. It is expressed in ratings, consisting of three sequential numbers, always recorded in the same order. Each number represents evaluation of one of the three primary components of physique, which describe individual variation in human morphology and composition.

Endomorphy, or the first component, refers to relative fatness and leanness of the physique; mesomorphy, or the second component, refers to musculo-skeletal development relative to height; and ectomorphy, or the third component, refers to the relative linearity of individual physique (Carter & Heath, 1990).

In athletes, body composition measures are widely used to prescribe desirable body weights, to optimize competitive performance, and to assess the effects of training (Sinning, 1996). It is generally accepted that a lower relative body fat is desirable for successful competition in most of the sports. This is because additional body fat adds to the weight of the body without contributing to its force production or energy producing capabilities, which means a decrease in relative strength. It is obvious that an increased fat weight will be detrimental in sporting activities where the body is moved against gravity (e.g. high jump, pole vault, volleyball spiking action) or propelled horizontally (e.g. running).

In running at any sub maximal speed, the oxygen requirement is increased with any increment in body weight that is, oxygen consumption is increased due to the greater energy demand required to initiate and sustain movement of a larger weight. Previous research has demonstrated that
athletes in all running events have less body fat compared to most other disciplines (Martin & Coe, 1997; Gore, 2000; Matkovic et al., 2003).

Anthropometry is the branch of anthropology that is concerned with the measurement of human body. The definition has confined to the kind of measurements commonly used in associating physical performance with body build. Anthropometry involves the measurement of external part of the body, including body diameters, body circumferences somatotypes. Specific anthropometric characteristics are needed to be successful in certain sporting events. It is also important to note that there are some differences in body structure and composition of sports persons involved in individual and team sports. The tasks in some events, such as shot put or high jump, are quite specific and different from each other and so are the successful physiques. This process whereby the physical demands of a sport lead to selection of body types best suited to that sport is known as “morphological optimization” (Bloomfield et al., 1995).

Body Composition is concerned in part with the obesity of the individual. In measuring this aspect of body composition, the total body weight is divided into two components: Lean Body Weight and Fat Body Weight. Lean Body Weight includes muscle, bone and vital organs. They underlying assumption is that total Body Weight equals Lean Body Weight plus Fat Body Weight. The higher percentage of Fat Body Weight in relation to Lean Body Weight, the higher the degree of Obesity (Verducci, 1980).

It is generally accepted that a lower relative body fat is desirable for successful competition in most of the sports. This is because additional body
fat adds to the weight of the body without contributing to its force production or energy producing capabilities, which means a decrease in relative strength. It is obvious that an increased fat weight will be detrimental in sporting activities where the body is moved against gravity (e.g. high jump, pole vault, volleyball spiking action) or propelled horizontally (e.g. running). Physical characteristics and body composition have been known to be fundamental to excellence in athletic performance (Mathur & Salokun, 1985). Specific athletic events require different body types and weights for maximal performance (American Dietetic Association, 1987).

Today it has been widely accepted by the experts that top performance in sports is achieved if an athlete possesses the basic anthropometric characteristics suitable for the event. There are numerous factors which are responsible for the performance of a sportsman. The physique and body composition, including the size shape and form are known to play a significant role in this regard. At present, sportsman for superior performance in any sports is selected on the basis of physical structure and body size. Structural measurement include anthropometric measurements which consist of objective measurement of structures such as height, weight, width, depth and the circumference of the various part of body.

Therefore, the athletes in a particular sport must possess such typical characteristics which are of advantage to their performance. Body composition also makes an important contribution to an individual’s level of physical fitness for performance, particularly in such sports that require one to carry one’s body weight over a distance, which is facilitated by a large
proportion of active tissue (muscle) in relation to a small proportion of fat tissue. Based on the above concepts and findings the researcher formulated the research problem to study the Anthropometric measurements and performances of high school Kho-Kho and Kabaddi players of Hyderabad Karnataka Region.

**STATEMENT OF THE PROBLEM:**

The problem formulated for the present study is “Critical Study on Anthropometric Measurements and Performances of High School Kho-Kho and Kabaddi players of Hyderabad Karnataka Region”.

**PURPOSE OF THE STUDY:**

The major purpose of the study is “Critical Study on the Anthropometric Measurements and Performances of High School Kho-Kho and Kabaddi players of Hyderabad Karnataka Region”. The study is conducted on high school Kho-Kho and Kabaddi players in the Hyderabad Karnataka region which compromises of six districts like Gulbarga, Bidar, Yadgir, Raichur, Koppal and Bellary. The study aims to analyze anthropometric measurements like body weight, height, shoulder girth, arm length and leg length circumferences (thigh, calf and relaxed arm) of high school Kho-Kho and Kabaddi players of Hyderabad Karnataka region.

The study also analyzes the performances of high school Kho-Kho and Kabaddi players during their district level matches. Further the comparison of anthropometric measurements and performances of Kho-Kho and Kabaddi players is done for making suggestions and recommendations to the
Department of Public Instructions and Ministry of Youth and Sports Affairs, Karnataka for the promotion and development of Kho-Kho and Kabaddi games in Hyderabad Karnataka region.

**OBJECTIVES OF THE STUDY:**

- To study and make Anthropometric measurements profile of Hyderabad Karnataka 8th to 10th Std. High School Kho-Kho and Kabaddi players.
- To analyze the Anthropometric measurements profile of six districts 8th to 10th Std. High School Kho-Kho and Kabaddi players of Hyderabad Karnataka region.
- The study also analyzes the performances of 8th to 10th Std. high school Kho-Kho and Kabaddi players during their district level matches.
- To compare the anthropometric measurements and performances of 8th to 10th Std. high school Kho-Kho and Kabaddi players of Hyderabad Karnataka region.
- To make suggestions and recommendations to the Department of Public Instructions and Ministry of Youth and Sports Affairs, Karnataka for the promotion and development of Kho-Kho and Kabaddi games in Hyderabad Karnataka region.

**HYPOTHESES OF THE STUDY:**

- The study would make the Anthropometric Profile of 8th to 10th Std. High School Kho-Kho and Kabaddi players of Hyderabad Karnataka region.
• The study would analyze the Anthropometric Profiles of six districts 8th to 10th Std. High School Kho-Kho and Kabaddi players of Hyderabad Karnataka region.

• The study would also analyze the performances of 8th to 10th Std. high school Kho-Kho and Kabaddi players during their district level matches of academic year 2014-15.

• The study would compare the anthropometric measurements and performances of 8th to 10th Std. high school Kho-Kho and Kabaddi players of Hyderabad Karnataka region.

• The study would make suggestions and recommendations to the Department of Public Instructions and Ministry of Youth and Sports Affairs, Karnataka for the promotion and development of Kho-Kho and Kabaddi games in Hyderabad Karnataka region.

**SIGNIFICANCE OF THE STUDY:**

This study assumes a great significance given to its comprehensive study to delineate the Anthropometric Profile and Performances of 8th to 10th Std. High School Kho-Kho and Kabaddi players of Hyderabad Karnataka region. The promotion and development of rural games like Kho-Kho and Kabaddi is a primary need in the Hyderabad Karnataka region, because most of the high school children’s in the Hyderabad Karnataka region play these games with lot of enthusiasm without any adequate facilities and support.

This study reveals the anthropometric measurements of high school Kho-Kho and Kabaddi players which enables to get the knowledge of their
body type and which further helps for making suggestions to various high schools and concerned departments of Hyderabad Karnataka for the improvement of performances.

LIMITATIONS OF THE STUDY:

- The study is limited to 720 high school Kho-Kho and Kabaddi players of Hyderabad Karnataka region.
- The study is limited to anthropometric measurements like body weight, height, shoulder girth, arm length and leg length circumferences (thigh, calf and relaxed arm) of 8th to 10th Std. high school Kho-Kho and Kabaddi players of Hyderabad Karnataka region.

DELIIMITATIONS OF THE STUDY:

- This study is delimited to 8th to 10th Std. High School Kho-Kho and Kabaddi players of Kalaburagi, Bidar, Raichur, Yadgir, Koppal and Bellary districts of Hyderabad Karnataka region respectively.
- The study is delimited to Anthropometric measurements and performances of 8th to 10th Std. High School Kho-Kho and Kabaddi players of Hyderabad Karnataka region.