CHAPTER I

INTRODUCTION

Sports and physical activity are extremely valuable to society. Besides enhancing physical health they are also a source of pleasure and contribute to a greater feeling of self confidence and independence. Participation in games and sports not only help in promoting social democracy but also develops unity of body and mind. It also provides fun, enjoyment and youthful exuberance. According to World Health Organization regular participation in sports can bring economic benefit in terms of reduced health care costs, increased productivity, healthier physical and social environments, better performing school, institutions and worksites and greater sports achievements.

No longer is the sports source of pleasure and enjoyment, it is being used for the purpose of diplomacy and health consciousness. Excellence in sports enhances the sense of achievement, national pride and patriotism. In its struggle for excellence, better said, a craze for supremacy amongst individuals, teams and nations has been given a good-bye; natural differences between the sexes have been ignored; inadequacy in natural power has been purported to be supplemented exogenously. Sport has developed and will be developing still further. So tremendous is the development that it has already been reckoned as a social force.

In the modern era sports and games have become highly specific and competitive in nature. Competitions are so tough now a days that even very small factors influencing sports performance, play an important role to excel in international competitions. India has been participating in the Olympic and other international competitions since 1900. In spite of huge population, India has not been able to cut many ices in the world of sports. The poor performance of Indian sportspersons at international level has been a matter of great concern, especially to the coaches, sports scientists and sports administrators. There is no dearth, in the fact that India has abundance of talented players but proper talent hunt and development of talented athletes is one of the reasons for dismal performance.

The condition of women sports in India was not encouraging in the past. Emancipation of women from the oppression and bondage was the slogan and
demand some decades ago. A very few women were permitted to take part in games and sports by their parents. Most of the Indian parents, instead of thinking sports as a necessity for the development of girls used to take it as promotion of early maturity in girls.

The situation has changed no doubt but not has come to the same level with men. Myths and attitudes, that women are physically, physiologically, socially and psychologically weaker, are fading away slowly. Women have already come a long way; they are participating in the Everest and Antarctica expeditions. The participation rates of women and girls in sports have risen dramatically, so the number of women taking part in sports during the last three decades has increased tremendously. Now girls in India take part in all competitive games and sports.

With all round advancement in the science of sports the new disciplines are emerging with super specializations. The element of scientific basis of selection is being inducted in the procedures of selection of athletes at various levels in some advanced countries. The knowledge from many scientific disciplines is being used for improving the criteria for selection of talent. The physical educationists have designed test procedures for evaluating the fitness of young children. The performance structure for different games and events is being evaluated. Proposals are coming up for the selection of potential athletes with the designs of tests and the body size predictions are also an important field in this regard. The genetic aspects of performance have also been worked out though to a limited extent. The physiological factors limiting one's performance in top level sports are also well known. The growth of psychological domain and a suitable social and demographic structure, originating from one's family, are also integral organic factors of an individual. It is the understanding of interaction of these factors that can help us designing the ways in selecting the children for appropriate games and training.

The idea is to put the interested individual in a game or event in such a way so that one gives out the best of one's abilities. In this connection, the role of physique is of utmost importance. There seem to be various unchangeable characteristics in the human body. For example, if the game of basketball needs the players to be tall, then those who are shorter cannot be made taller under normal conditions.

To excel in a physically competitive sport, the player must possess such dimensions of body characteristics which suit the most in his/her sports. It is therefore, because of this reason, the anthropometric or physical characteristics are
known to be of fundamental importance for individuals’ development to achieve Olympic level performance in a sport. The physique which includes the evaluation of size, shape and form of an individual is of prime importance as to know how far an individual can succeed in becoming a top athlete.

The greater propagation of interest regarding a particular type of physique that produces an athlete with greater performance for a particular event came up around the middle of the twentieth century. Several investigators have studied the relationship of morphological, anatomical and structural characteristics with physiological and functional phenomena. Most of them have come to the conclusion that a certain correlation exists between the physique or build of the body and the motor capacity.

A scientific approach in the field of sports plays a vital role in improving the sports performance. The sports scientists are of the view that performance in various sports and games is influenced by many factors such as level of physical abilities, techniques, psychological traits, nutrition, sociological and physiological characteristics. For the harmonious development of body and to excel in sports, it is necessary to determine the physical status of children and youth by measuring anthropometric parameter and evaluating motor abilities. This will certainly yield an estimate of physical fitness to appraise the nation the level of development and possibility to become champion athletes of future.

There has always been a natural curiosity about what make champions? What physical characteristics they share? Which they are born with and which were acquired and developed? The study of available literature shows that more than certain physical characteristics are required to make a champion. Apart from the other trainable factors the body structure, physical and motor abilities are definite predictors of the degree of efficiency and the level of excellence of an athlete.

Evaluation of physical fitness might be essential from the point of examining one’s motor development in relation to age and secondly to understand the training strategies to be adopted in relation to one’s developmental status. Physical fitness is the ability to carry out daily tasks with vigorous and alertness without undue fatigue and with ample energy to enjoy leisure time pursuits and meet unforeseen emergencies (Kemper, 1986)

The totally fit person has a healthy and happy look out. The physical fitness may be interpreted in terms of the individual's capacity for the performance and their
endurance in physical activity. Physical fitness can be achieved through the co-
ordination of all the aspects like mental, social, environment and emotional
conditions. Regular physical activities and exercises stimulate growth and
development. Fitness improves general health and is essential for full and healthy
living. The physically fit children can do things with ease and are able to move the
confidence. The body structure change according to the age and basic abilities.
Thought it is a well known fact that the development of different basic abilities are at
different rates, most of these physical fitness abilities reach high between the age of
18 and 22 years.

Fitness is the state which characteristics the degree of which a person is able
to function efficiently. The American Association of Health Physical Education and
Recreation (AAHPER) through its talk force on youth fitness has advocated for the
general population the need for physical fitness consisting of an emphasis on
components. These components also represent the ingredients for performance related
fitness. The fitness level is classified into different types, highly fit, lowly fit and
average and least fit. The trainer or physical education teacher are having full
responsibilities and has to bring up the least fitness in order to determine the future
performance not only in competitive sports but also in day to day task. The factors are
measurable and changeable. It is dependent upon heredity, nutritional habits, and
nature and extent of physical activity.

Physical fitness has dimension and it has high and low limit. It is a matter of a
degree everyone has some of it, Physical fitness is a complex area that consists of
number of factors which includes primarily Strength, Endurance (Cardio Vascular
endurance, Muscular endurance), Agility, Speed, Balance, Flexibility (Extent
Flexibility, Dynamic Flexibility), Leg Power, Co-ordination. Knowledge about
the different components of physical fitness may help to predict the performance in
the complex skills of competitive sports. It is also true that certain basic abilities,
which limit skill acquisition, should be developed in pre-adult life.

Israel (1977) studied the effect of aerobic, anaerobic and pulse work out
exercise on selected physical fitness parameters of 65 male undergraduates for five
weeks training and it was conclude that the aerobic and pulse rate workout exercise
increased the cardiovascular endurance as compare to anaerobic.

Many studies have been conducted with regards to the effect of anaerobic
training programme on physiological variables and other sports. However few studies
have examined the effect of anaerobic training on physical fitness variables. Although the physical fitness is known to be trainable but the influence of one’s anthropometric status, physique and body composition seems to play a greater role in its determination as achievement of high level performance is only possible in an individual with adequate genetic predisposition and under optimal environment condition. The motor ability depends on various anthropometric measurements and influences the performance in athletic and sports activities. Maxwell (1980) found the significant correlation between various body measurements and motor performance. The relationship have been studied extensively and positive relation have been confirmed between physique and physical performance (Cureton, 1947; Karvonen, 1958; Bernard and Postma, 1961; Wolanski and Pysnik, 1972; Mokha and Sidhu, 1986; Ahluwalia et. al. 1987; Singh 1998).

It is well established from the related literature that physique, body composition and anthropometric characteristics differentiate champions of various sports activities within a group and also from normal participants. However, till now the morphological characteristics of sportspersons have been studied in the various sports activities as in track field (Kohlraush 1929; Cureton 1951; Sodhi & Sidhu 1984) Basket ball (Hirata 1966; Carter 1970; Sodhi 1980; Bale 1986; Kahlon 1988) Body building (Borm et al. 1984) Cycling Singh et. al. (1995); Football (Bell 1973; Sidhu and Wadhan 1974) Gymnastics (Carter 1970); Hockey (Malhotra et al. 1973; Sidhu et al. 1974) Judo (Claessens et al. 1986) Volleyball (Sodhi 1980; Kansal et al. 1983; Sandhu 1987) Wrestling (Carter et al. 1984). In most of the above given studies it has been concluded that certain correlation exist between the body build and the working capacity of individuals (Willgoose & Roger 1949; Hawthrone 1954; Perbex et al. 1954; Berend 1960; Sandhu 1993).

Various other studies also suggested that different body size, shape and proportions are beneficial in different physical activities (Bramwell & Ellis 1931; Krakower 1935; Cureton 1933, 1941,1951; Parnell 1951; kroll 1954; Tanner 1964; Dupertius 1965; Hirata 1966; Malhotra et al. 1973; Kansal et al. 1986; Sidhu et al. 1996; Koley.S 2005). However, till date the difference of various anthropometric measurements are not clearly known in sports and non-sports girls with regards to different age groups.

A growing child passes through various stages of growth and development. Growth remains dominant biological activity mostly during the first two decades of
life. By description it is the distance traveled by a child along the road to adulthood and continues from birth till full form is attained. During the growing periods growth passes through many stages during which, the rate of growth never remains constant. It is some times faster and becomes slower at another time. The adolescence phase was not given much emphasis until recently for serious competitions in sports. However, now it is considered to be an important period for preparation for high pressure competitions.

According to Macek and Vavra (1980), increased attention has been paid to the sports in childhood and adolescence, since it has been realized that top performance in many sports is reached only if appropriate sports training is started at a very early age. A growing child passes through stages of growth and development. Therefore, a coach of physical education must have knowledge in this regard so that he is able to train children in a better manner. It seems essential to monitor the growth status of the growing child along with change in motor development during this phase. A growing child participating in sports and physical education programmes might be assessed regularly with these norms. It seems essential to monitor the growth status of the growing child along with change in motor development especially during adolescence. An understanding of the factors determining performance for a particular sport and the evaluation of growth processes might be integrally useful for interpretation of strategies for coaching and training.

During adolescence, children of the same age group show variation in their growth status. Regular physical activity during childhood results in a favorable influence on the individual performance during growth. Among various workers who have significantly contributed to and understanding of physical activity among growing children mention may be made of the following: Jorgensen and Hatlestad 1940, Cureton, 1941, 1947; Jokl, 1945; Barry et. al. 1961; Parizkova and Paupa 1963, Wolanski and Pysn, 1972; Karir and Sidhu, 1985 and Sidhu & Singh, 1985. Therefore anthropometric characteristics of athletes are of great interest to human biologists and sports scientists as different sports demand specific form of body for specific competition. Estimation of the anthropometric characteristics of these athletes provides a valuable reference point in human structure and function.

Anthropometry is the quantitative study of size, shape, proportion, composition and maturation in relation to gross function (Carter, 1985). The application of anthropometric knowledge is getting tremendous importance and
popularity to identify the potential talents in sports for particular event. There is an ample scope for anthropometric study in India. Anthropometry helps us to understand human movement in the context of growth, exercise and performance. The relationship of anthropometric characteristics with physical performances have been studied intensively by Mokha and Sidhu, 1986; Ahluwalia et.al.1987; Sodhi et.al.1990; Yadav et.al.2006; Kanupriya et.al, 2007 and by many other scientists.

The role of physique is very important in the view point that morphological constituent and its proportion in the human body is genetically determined and it can not be changed under normal circumstances. Eiben defines physique as the morphological constitution of the adult person which is formed by the manifestation of general endowment, and as a result of adaptation process to environment effects. Physique refers to the shape, the size and the form of an individual. Of course, the three factors are intimately linked with each other and are manifestation of the internal structure and tissue components which in turn, are influenced by the environmental and genetic factor (Sodhi and Sidhu, 1984). The development of physique in a particular sport seems to have a close link with the development of strength required in most sport activities. Further, the athlete while under training for a longer duration develops physiological adaptations resulting finally in some morphological adaptations too. After studying the physique and body composition of Olympic track and field athlete at Rome Olympic during 1960, Tanner inferred that the athletes were both born and made,’ The basic structure’ he stated” must be present for the possibility of being an athlete to arise.” Various other studies also suggested that different body size, shape and proportions are beneficial in different physical activities (Bramwell&Ellies1931; Krakower1935; Cureton 1933, 1941, 1951; Kroll 1954; Dupertius 1965; Hirata 1966; Malhotra et al. 1972; Kansal et al. 1986; Sidhu et. al.1973, 1975, 1984, 1996; Singh 1998. Kanupriya et al . 2007).

Modern research in the field of sports has shown interest to find out the body composition of the athletes because it affects on performance. Body composition changes as the physical activity changes. Therefore a coach is expected to pay attention to body composition in order to construct a training schedule for improving one’s performance and to select the appropriate event.

In the quest to optimize performance of the elite athletes, the Sports Scientists has sought to determine the ideal physique and body composition for a given sport or event. Theoretically the most successful athletes are those with the appropriate body
structure and composition to perform their event. The quantity and proportion of various constituents of the human body are empirically linked with health, disease, and quality of life, proportionate changes during growth, functional relationship with fitness and sports performances, nutrition and many others. As a result, the interest in body composition has been increasing in decades. Its absolute magnitude and augmentation as a result of physical activity have relevance in sports. Development of the components in the body, i.e. muscle, bone and fat, is reflected in physique and physical characteristics or in other words the structures of an individual.

The body tissue that undergoes the widest fluctuations throughout the growth, maturity and old age, is the body fat. As such, levels of fatness are basic variable in the study of human morphology, differing by sex, age, environmental condition and genotype. They also provide an indication of nutritional and health status. (Eveleth, 1986 and Tanner, 1964). The grading of body fatness relates to the concepts of obesity and leanness. However attention seems to be given to an easy recognition of obesity despite it's marked clinical and social importance commonly defined, obesity is excess fat and the leanness refers to body weight without fat weight.

Describing the link between exercise performance and body shape, size, proportion and composition provides clues to the ideal physique for a sport or event. Collecting data on the elite athlete can therefore be used as a feedback to the coaches and athletes. It is important to remember that although an athlete may have the appropriate physical structure, factors such as physiological functions, psychological make up and biomechanical constraints all contribute to athletic performance.

Many of the methods for composition assessment are laboratory-based techniques and are impractical or too expensive for the routine testing of athletes or for large-scale data collection. Anthropometry is the most validated against a cadaver sample. Kinanthropometry, which has developed from Anthropometry, is concerned with measurement and evaluation of different aspects of human movement and individual variation in body shape, size, proportion and composition.

Among the three principle components of body composition viz. fat, muscle and skeletal masses, assessment of fat mass plays an important role. For athletes involved aesthetically judged sports (such as gymnastics, and diving), maintenance of lower body fat level are important for appearance standard of sport and biomechanical efficiency during tumbling. In weight bearing endurance sports like running, race walking and cycling, lower body fat levels help to enhance efficiency and heat
dissipation while in weight category sports considering the two athletes with identical body weight, relative greater amount of body fat may lead to one into disadvantage over the opponent with relatively greater amount of muscles and bone masses (Sodhi, 1986). Therefore, the study of body composition in sports is essential because it reveals the development of different tissue components in sportsmen specializing in different physical activities. Studies have shown that high percentage of body fat not only serves as dead weight, but it also lessen the relative ability to supply oxygen to the working muscles thus cutting down one's cardiovascular endurance (Steven, 1980)

Body composition refers mainly to the evaluation of three principle tissue components of body, i.e., muscle, bone and fat. It is well known that short term training influences the dynamic balance of muscle and fat in the body. The long term training may influence even the development of osseous tissue in an individual. Therefore, it becomes essential to study the athletes and sportsmen especially the high performance athletes

Lean tissue and subcutaneous tissue have important roles to play in the performance. Many investigators have reported a relationship between these two components and physical performance (Parizkova, 1962 1963; Dupertuis, 1965; Behnke and Royce, 1966; Cureton et. al., 1975; Shaver, 1980; Slaughter et. al., 1980; Meleski et al., 1982; Mokha and Sidhu, 1986; Singh and Kaur, 2009). The body composition studies have been conducted very extensively on the athletes. The examination of body fat and skinfolds at selected sties is most important in them.

It has been found that the athletes who were lean or less fatty but heavy because of a well developed musculature were superior in performance in certain competitive sports. On the other hand the athletes who has substantial amount of adipose tissue have permanently increased energy demands owing to the inert weight of fat, thus making the work more difficult to perform in such activities where the body has to be projected as in jumping movements, or propelled against gravity over long distance as in distance running. Contrarily, the long distance swimming, water polo and synchronized swimming are sports wherein moderate levels of fat may actually aid performance by providing additional buoyancy (Carter & Yuhasz, 1984) and insulation provided by the fat to a reduced heat loss. Considering the Olympic athletes as the best, the degree of subcutaneous fat can be considered to be of optimal requirement as a guideline for examining the national athletes in any country. Further in physical education, the evaluation of fat is essential for the common man too for
most men and more particularly the women, in modern society would like to avoid having large fat depots and protruding extreme endomorphic bellies and breasts. This is essential features of one's organic, psychic and physical fitness. The researcher felt that improvement in terms of physique and body composition would help improving performance standard of Indian sports women. One of the reasons of lower performance standard of non-sports girls, when compared to that of sports girls, might be due to poor physique. The investigation, therefore, was undertaken to study the anthropometric characteristics, physique, body composition and motor abilities of sports and non-sports girls in different age groups.

STATEMENT OF THE PROBLEM

Modern scientific age has been marked by the progress made in all area of human endeavor in which games and sports hold prominent place. Performance in various sports and games is influenced by many factors such as level of physical abilities, techniques, physiological, psychological and sociological. It is only few years back that research efforts are being made to find out the anthropometric characteristics including physique and body composition of sportspersons and their impact on performance. It is therefore reasonable to expect an athlete's demonstration to find the relationship of structure and function. The role of physical structure and performance in Indian sports girls are not clear with respect to different age groups. Therefore the present researcher has endeavored to know the anthropometric measures and various motor abilities of sports and non-sports girls. The study will also attempt to know the relationship among motor abilities, anthropometric measurements, body composition and somatotype in sports and non-sports girls of different age groups. The present study is stated as "A STUDY OF ANTHROPOMETRIC CHARACTERISTICS AND MOTOR ABILITIES OF SPORTS AND NON-SPORTS GIRLS"

OBJECTIVES OF THE STUDY

The study was conducted with the following objectives:

1. To find out the difference in anthropometric measurements, physique and body composition between urban sports and non-sports girls of different age groups.
2. To find out the difference in anthropometric measurements, physique and body composition between rural sports and non-sports girls of different age groups.
3. To find out the difference in anthropometric measurements, physique and body composition between pooled sports and non-sports girls of different age groups.
4. To find out the difference in motor abilities between pooled sports and non-sports girls of different age groups.
5. To find out the difference in motor abilities between urban sports and non-sports girls of different age groups.
6. To find out the difference in motor abilities between rural sports and non-sports girls of different age groups.
7. To determine the relationship of motor abilities to anthropometric measurements, physique and body composition of sports girls.
8. To determine the relationship of motor abilities to anthropometric measurements, physique and body composition of non-sports girls.

HYPOTHESES

a. There would be significant differences in anthropometric measurements, body composition and somatotype between sports and non-sports girls of different age groups.

b. There would be significant differences in anthropometric measurements, body composition and somatotype among sports girls within groups.

c. There would be significant differences in motor abilities between sports and non-sports girls of different age groups.

d. There would be significant differences in motor abilities among sports girls of various age within groups.

e. There would be significant differences in anthropometric measurements, body composition and somatotype among rural sports and non-sports girls of different age groups.

f. There would be significant differences in anthropometric measurements, body composition and somatotype among urban sports and non-sports girls of various age group.
g. There would be significant differences in motor abilities among sports and non-sports girls of different age groups.

h. There would be significant differences in motor abilities among rural sports and non-sports girls of various age with in group

i. There would be significant differences in motor abilities among urban sports and non-sports girls of various age with in group

j. There would be significant relationship between motor abilities on one hand and anthropometric measurements, body composition and somatotype on the other hand in sports girls.

k. There would be significant relationship between motor abilities on one hand and anthropometric measurements, body composition and somatotype on the other hand in non-sports girls.

DELIMITATION

1. The study was confined to the girls only
2. 408 girls were randomly selected from Moga and Ferozepur districts of Punjab out of which 204 were sports and 204 were non sports school girls.
3. All girls ranged in age from 11 to 19 years.
4. The sports girls were those who had participated at least at district level of competition. Non-sports girls were those girls who have never participated in any sports competition and physical activities.

SIGNIFICANCE OF THE STUDY

The knowledge of motor performance of sports probable at thee adolescent age is very important in order to guide them scientifically for the selection of an appropriate game/sport activity. The result of this pioneer study are expected to be very useful for people in general and to coaches, physical education teachers, sportswomen/sportsmen, child specialists and sports scientists in particular will not only help in their general well being but are also expected to form the baseline criterion for screening school girls for appropriate games/sports. For the harmonious development of body and mind in our school children, it is very necessary to determine the status of our children and youth by measuring selected parameters
which will certainly yield an estimate of physical fitness to apprise the nation the level of development and then device suitable way and means to counteract the deficiencies, if any in time, to produce healthy citizen for the future good of our country.

It seems essential to monitor the growth status of the growing child along with change in motor development especially during adolescence. An understanding of the factors determining performance for a particular sport and the evaluation of growth processes might be integrally useful for interpretation of strategies for coaching and training.

Though the numbers of studies have been conducted on the Indian sports girls which dealt with their anthropometric characteristics, but as far as sports and non-sports girls of Punjab are concerned nothing has been done exhaustively in their motor abilities with respect to age groups.

The norms of the study may be helpful to the physical educationists, sports scientists and coaches to understand the factor determining performances and classify the players on the basis of physique and anthropometric variable for homogeneous group formation. Result of this study would help the girls to evaluate themselves, so as to give better performance. The norms worked through study will be helpful for assessing general health fitness profiles of sports and non-sports girls of different age groups.

The result of this study may provide knowledge as to the anthropometric characteristics in which sports girls differ from non-sports girls in different age groups. The analysis of result of this study will further help coaches to train children in better manners and predicting performance which ultimately help for promotion of games and sports in India. The results on the study of relationships of anthropometric variables with motor performance variables, in addition to theoretical education value, will also have practical utility for guiding sports probable. In other words, the results of the study will be both for filling the gap in the existing knowledge and for practical utility for human welfare and sports excellence.

It may also be expected that the results of the study may have potential significance in decision making guidance and placement of individuals in different games/sports and in the identification of potential successful candidates for different games/sports.