Chapter I

INTRODUCTION

Physique is a factor in sort of success that may lead to inclusion in an Olympic team, or more negatively, that lack of proper physique may make it almost impossible for an athlete to reach that degree of success (Tanner 1964).

"To the great thrust of human spirit there is no frontier" (Surendranath, 1987). It is this limitless and indomitable thrust of the human spirit that enabled men, young and old, rich and poor to have laid down their lives through the history of human civilization in attempting to fulfill the greatest of all obsessions.

Numero Uno. Number One. It is the ultimate thing, the mother of all peaks. Nothing in life is viewed with quite so much awe, nothing in life is more coveted, more passionately sought. And nothing in life is quite as elusive. From the caves of the Dark Ages through the castles of the Middle Ages and on to the post-Modern era, man has never ceased to be fascinated by this number. The best, the first, the greatest, the most powerful, the richest, the strongest, .... Well, the urge to be No. 1 is the mother of all ambitions.
Yet, in no area of human activity does the peak, that ultimate of heights, seem as wonderfully clear as in sport. There are no ambiguities here, no may be or perhaps. It is all so pure and simple, or so one would imagine.

Who is the best nuclear scientist in the world? Who is the best anthropologist in the world? Or who, for that matter, is the best violinist? All these are open to endless debates, and any way we seldom bother to establish the Number Ones here.

But sport is different. Often the very purpose of all the sporting activity at the highest levels is to prepare the ground for the coronation, is to celebrate the installation of the new Kings and Queens. The race may not always go to the quickest, nor the fight to the strongest but to the hundreds of millions who follow modern sport, nothing is quite so important as being able to find out who is the BEST. And here again, it is in the one-on-one sport rather than in a team game that the obsession with the ultimate number becomes all pervading (Shekar, 1992).

Sport is a manifestation of all that goes to denote and define the ennobling qualities in an individual. Sport is a fight to the finish. There are no
half measures. There has to be a winner, and a loser. In no other sphere of life is the barrier so clearly chalked out between a winner and a loser.

There is a clear demarcation between sportsmen and the successful sportsmen. It is the sustained, scientific and systematic efforts that spurs every person who participates in competitive sports to achieve the highest possible performance results. But there are very few who come to the top and attain international level performances. Many factors, such as physique, body composition, his/her technique, tactics, physiological and psychological make up of an individual, physical conditions, etc. play a paramount role in achieving optimum performance.

Hohmann and Brack (1983) have regarded physique as one of the basic factors for optimum performance.

Competitive sports has made the generation of athlete and coaches to follow a systematic training and shape their way of life accordingly. Competitive sport attains its greatest effectiveness in the process of physical, physiological and psychological perfection of man through organised training and competition.

A general survey of sports activities has revealed that the track and field athletics which
basically comprises of walking, running, jumping, throwing, etc. is the mother of all sports. That is why almost all the tests of physical fitness involve the measurement of mere ability based on running, jumping and throwing activities.

At each Olympic Games, the standard of performance rises and new records are set for human skills and endurance. To a small extent, it is due to the development of track facilities and equipment, but to a greater degree to the improvement in the methods and availability of coaching based on scientific research in the area of physiological, biomechanical, psychological and medicinal aspects of sports.

But mostly the improvement is due to the athletes themselves. Perhaps they are more gifted now than previously; perhaps Elliott and Zatopek are absolutely better runners than Wooderson and Nurmi could ever have been. In the sprints, the jumps and the throwing events at least, it is hard to resist the conclusion that the modern athlete is actually better endowed physically and better suited to his particular task. Clearly the search for better men has been successful.

Yet, if we are asked to specify in what ways the modern athlete is better, even at such a simple level as
body structure, we cannot answer. We know practically nothing specific about the build of the earlier Olympic athletes. Kohlrusch (1929) reported a few measurements and gave some pictures of a number of competitors in the 1928 Amsterdam Games, but it is a pioneer work lacking in detail and elementary analysis. Cureton (1951) studied 22 American track and field athletes at approximately the time they were contending for places in the United States team in the 1948 Olympic Games. His book gives valuable data on their heart size, electrocardiogram, pulse wave form and other physiological indices, together with some body measurements and photographs of 15 individuals who would probably have the athletic standard we require. This also is a pioneer work of much interest, but naturally the results were severely limited by the small number of subjects.

If any relation exists between physique and success in one event rather than another it is argued. This will show up more clearly in groups where the extremes of competition has acted to equalize all other influences such as motivation and training.

"Among life's dimension, physique takes its place; it houses the whole life of man, without it, birth is impossible and its death marks the biological
end". The study of body build relative to physical activity is not new to the field of physical education. Over the years, such a relationship has been well established and generally accepted by both the researchers and practitioners. Representative studies such as those of Sill and Mitchen (1957), Parnell (1958), Tanner (1964), Carter (1970) and deGaray, Levine and Carter (1974) have well demonstrated the influence of body size and shape on physical performance (Tomar, 1981).

Several studies conducted on Olympic athletes have revealed that various sports events differ from one another not only in their skill pattern, organisation and equipment requirement but also in the requirement of the typical anatomical structure (body build) of athletes participation in them. To excel in sport one must possess such typical characteristics, the lack of which is likely to affect one's performance.

Under modern circumstances, especially related to training for sports and games or any event with a focus on superior performance, emphasis is given for physical structure and body build of each individual participant for each sports and games. Therefore, it is evident that the body build popularly known as
"physiognomy" gets primary emphasis at the time of selection of the player concerned sports where superior competition is involved. Hence, the trend in the field of games, sports and physical education is to assess the related components as a part of the total body build and size of each player and also to interpret how far these components are helpful in the performance of games and sports under competitive conditions (Johnson, 1974).

The measurement of structure and proportion of the body is called Anthropometry. Anthropometry consists of making external measurements of the human body. The results can be used to appraise body build, nutritional status and posture (Mayors, 1974).

Certain anthropometric considerations, somatotype features and racial traits are identified as advantageous for performance in top sports. An athlete for superior performance in any sport is selected on the basis of physical structure and body size he possesses (Carter, 1982; de Garay et al., 1974).

Emphasising on the role of physique in obtaining outstanding performances in sports it is the kinanthropometric or physical characteristics that are known to be of fundamental importance. Tanner examined the physique and body composition of Olympic Track and
Field athletes at Rome during 1960 and inferred that the athletes were both born and made. Studies on physique may be useful in choosing a suitable physical activity for an individual whose main objective is competition (Tanner, 1964).

Human motor performance is a composite of many variables one of which is structure of the body. The specific measurement of limb length, circumference, breadths and build indices can reveal the relationship between anthropometry of the athlete and his motor fitness. Measurement of body size include such descriptive information as height, weight and surface area, while measures of body proportion describe the relationship between height, weight and among length, width and circumference of various body segments. It has been found that top athletes in some sport tend to have those proportions that biomechanically aid the particular performance required (Zeigler, 1982).

Thus, sports anthropometry has developed as a special branch not only as a parameter or selective diagnostic procedure but also as a performance prediction tool.

Human bodies are widely divergent in their size, shape and compositional characteristics. It would
therefore seem that the full anthropometric description of human physique would require the assessment of a great number of bodily dimensions. This inference is clearly seen to be supported with regard to past anthropometric practice, many lengths, breadths, girths and skinfold widths of different type have been measured in order to describe the anthropometric profiles of human bodies.

Strategies in anthropometric studies have been characterized more by a desire to record data on as many variables as possible than by conceptual clarity about which features on phenomena of interest are of importance or not.

There are several methods of describing the characteristics of human physique. One is through the classification of body type according to its appearance. Somatotyping is one such method.

A somatotype is a description of present morphological conformation. It is expressed as a rating 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 variations 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 the physique (Carter et al., 1982).

For convenience somatotypes can be classified into different categories. They are

a) Balanced Endomorphy - in this type the first component is dominant and the second and third components are equal.

b) Mesomorphic Endomorph - in this type, the endomorphy is dominant and the second component is greater than the third.

c) Mesomorph Endomorph - in this type, the first and second components are equal (or do not differ by more than one-half unit) and the third component is smaller.

d) Endomorphic Mesomorph - in this type, the second component is dominant and the first component is greater than the third component.

e) Balanced Mesomorph - in this type, the second component is dominant and the first and the third
components are less and equal (or do not differ by more than one-half unit.

f) Ectomorphic Mesomorph - in this type, the second component is dominant and the third component is greater than the first component.

g) Mesomorphic Ectomorphic - in this type, the second and third components are equal (or do not differ by more than one-half unit) and the first component is lower.

h) Mesomorphic Ectomorphic - in this type, the third component is dominant and the second component is greater than the first component.

i) Balanced Ectomorphic - in this type, the third component is dominant and the first and second components are equal and lower (or do not differ by more than one-half unit).

j) Endomorphic Ectomorphic - in this type, the third component is dominant and the first component is greater than the second component.

k) Endomorphic Ectomorphic - in this type, the first and third components are equal (or do not differ by more than one half-unit) and the second component is lower.

l) Ectomorphic Endomorphic - in this type, the first
component is dominant and the third component is greater than the second component.

m) Central - in this type, no components differ by more than one unit from the other two, and consists of rating of 2,3 or 4. (Carter, 1980).

There is no dearth of scientific evidence to support the claim that there are body size differences among athletes in different sports and for events within the same sport. However, much of the evidence is limited to height and weight, and only a few studies involve international samples of Olympic athletes. So far as the Indian scenario is concerned, it is too limited and the studies concerning the Indian University level are rare. Some studies have reported little more than height and weight. Many have concentrated their analysis on male athletes either in track and field or in some other sports. Even at the International level it is the same and only a few have reported more than height and weight on female athletes.

Height, weight, segmental lengths, breadths and girths (and sometimes skinfolds) have been used to describe and compare body size. Results from various studies showed large size differences between athletes in some events and sports, but some similarities between
others. Ethnic differences were observed in some events, but these differences were often less than those among events. Some authors have suggested a secular trend towards increasing size in some events. Female athletes were generally smaller than male athletes except for bis iliocristal breadth and skinfolds (Carter et al., 1982).

Although our knowledge of physique of the athlete has been increased by past studies, many gaps remain. In this competitive world of games and sports numerous qualities are needed to become an elite performer. Self devotion, perseverance, sound physique, intensive training, better mental, and emotional balance are some of the essential requirements.

Therefore this study is being undertaken to describe and compare the size of the Inter University Track and Field Athletes competing in the selected track and field events in both male and female sections. The purpose also included to find out the body types of both male and female athletes in those selected events by using the Heath - Carter method of somatotyping. Quantification of size as measured by a variety of variables may enable us to understand better some of the physical factors possessed by the athletes belonging to each of the selected events.
Statement of the problem

The purpose of the study was to establish the influence of selected anthropometric measurements and body types on selected Track and field events.

Delimitation

1. The study was delimited to the athletes who represented University in 100 meters, High Jump and Shot Put in the South Zone and the All India Track and field Meet held at Thiruchendur (Tamil Nadu) and Chandigarh (Punjab) in the year 1990 and 1991 respectively.

2. The study was further delimitated to 90 male and 90 female athletes belonging to the age group of 18 to 24 years.

3. To assess the body types Heath-Carter (1980) somatotype method was adopted and the below mentioned anthropometric variables were selected.

a) Height
b) Weight
c) Shoulder width or Bis acromial diameter
d) Thigh-width or Bis iliac diameter
e) Elbow width or Bicondylar Humerus diameter
f) Knee width or Bicondylar femur diameter
g) Arm circumferences.
   (i) Upper arm
   (ii) Fore Arm.
h) Calf girth  
i) Thigh girth  
j) Leg length and  
k) Arm length.

Limitations

1. Non-availability of sophisticated instruments was accepted as a limitation of this study.

2. Since the subjects were from different socio-economic status, the uncontrollable factors that might have had an effect on the physique and performance of the subjects were identified as a limitation of this study.

3. Since the training patterns, schedules and techniques used by the athletes varied, this is also considered to be a limitation.

Hypothesis

On the basis of the literature gone through, research findings and the scholars understanding of the problems, the following assumptions were formulated with regards to the present investigation.

1. Anthropometric measurements will have significant impact on selected track and field events for both sexes.
2. There will be differences in body types between Throwers, Jumpers and Sprinters.

3. No significant differences in body types will be found between sprinters and jumpers.

**Definition and Explanation of Terms**

**Anthropometry**

Anthropometry consists of making external measurement of the body. The results can be used to appraise body build, nutritional status and posture (Mayors, 1974)

Anthropometric measurements are dimensions of the structure of the human body taken at specific sites to give measures of length, girth and width (Mathews, 1978)

According to Philips and Hornak (1979) the measurement of the structure and proportions of the body is called anthropometry.

**Body Types**

Body types is defined as the technique of categorising the athlete into various groups on the basis of their body structure
Significance of the study

The standard of sports and sportsmen in India are of great concern to many because of the poor performances in the National and International arena. The causes of the same are abundant such as poor economic condition, training methods, lack of sophisticated equipment and facilities, proper guidance and such others.

Apart from the above mentioned factors there are certain underlying causes within the individual—the physical, physiological and psychological factors, which are not taken care of accordingly. Here in this study an effort has been made by the investigator regarding one of the basic factor called 'physique' of an athlete and its contribution to the achievement or performance of an athlete or to see the extent of the role played by physique on different Track and field events.

In this context, the present investigation may contribute in the following ways.

1. Studies on physique may be useful in choosing a suitable physical activity for an individual whose main objective is excellence in competition.

2. The study will be of great importance for those who are engaged in the coaching of athletic events
choose the appropriate athlete for a particular event.

3. The study will further enhance the knowledge of physical educators to categorise athletes according to their body types.

4. This study on physique, which includes the evaluation of size, shape and form of an individual, will help to know how far an individual can succeed in becoming an elite athlete.