

# SOMATOTYPES OF FOOTBALL PLAYERS OF MEGHALAYA

*Dissertation*

Submitted in Partial Fulfilment of the Requirement for the Award  
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**MASTER OF PHILOSOPHY**

**IN ANTHROPOLOGY**



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The content appearing in this dissertation is original and has not been submitted in part or whole for any other diploma or degree of any University or Institution. The contents of this dissertation are to the best of my knowledge

## CERTIFICATE

Certified that the subject matter of the dissertation is the record of work done by **JOHNSLY WELL DKHAR**, that the contents of his dissertation entitled "**SOMATOTYPES OF FOOTBALL PLAYERS OF MEGHALAYA**" did not form a basis of any previous degree to him or to the best of my knowledge to anybody else, and the dissertation had not been submitted by him for research degree in any other University.

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**DECLARATION**

The content embodies in this dissertation is original and has not been submitted in part or full for any other diploma or degree of any University or Institution. The contents of this dissertation are true to the best of my knowledge and belief.

*Apkhar*

**(JOHNSLY WELL DKHAR)**

**SHILLONG**

**THE 30 DECEMBER 1991**

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*Asokhar*

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**CHAPTER I**  
**INTRODUCTION**

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## IMPORTANCE OF SPORTS

Sports activities bring people of different region and cultures together, provide a very healthy form of recreation, help in building up character and attitudes which can prove helpful in meeting the challenges of life more effectively. Sports in recent times are mainly of a competitive nature though their recreative values cannot be underestimated or denied. Sports now-a-days have changed a lot and are more scientific and mass oriented, well organized, elevate mental and physical stamina of participants, help to acquire sound health and courage to fight against difficult situations, cater to basic needs of players and elevate their economic status, bring honour and social dignity to successful participants, teams and countries, and forge national integration and international peace and brotherhood amongst the people of the whole world.

A nation cannot thrive well without the advancement of sports. Sports have got tremendous national value. These have immense importance and influence over people of all ages. A country or a state may be poor in its economical or educational aspects, but if it can produce great players and athletes then that country can enjoy a high position and respect throughout the world. The motto of sports espe-

cially in the international meets is 'to bring and preach peace and unity among the nations', and the prestige of a country depend on the behaviour, culture, and dignity of its sportsmen.

Countries which are sports conscious, have achieved higher ranking in international competitions. These countries are already in possession of valuable information and to a significant extent have based their systems of training on this knowledge. Due to growing changes in the competitive philosophy of sports a rapport has developed among sports scientists, physicians, coaches and sportsmen to discover modern scientific techniques in terms of selection of sportsmen best suited to the activity and to derive new tactics and training methods. Countries like USSR, GDR, Cuba, USA, etc., have a well developed system for sporting talented persons and for scientifically training them, from over a period of several years.

The term 'sports' has been coined from the word 'disport' which means diverting one self merely for fun or merry-making. Sports and games historically were designed for men. Adaptations were made later on for women. Sex roles in most societies are specific and well defined. However, the cultural prescription associated with gender will vary from group to group and from time to time.

Success in competition is not guaranteed but correct training makes success possible. If techniques, strength and fitness are improved, then the chances of being successful are increased. Cratty (1968) suggested that factors at three levels contribute to a person's final, motor or athletic performance, the basic behavioural support underlying all performance, the person's physical ability traits, and, the specific skills required in the relevant task.

According to Hardayal (1984),

"Each sport activity demands different types and levels of different motor abilities and when a sportsman possesses that he is said to have a specific physical fitness. It is this specific fitness which makes it possible for a player to perform unusual and extraordinary movements and to do so at a high standard of efficiency. It is also termed as 'performance fitness'."

The dictionary meaning of sport is amusement, diversion, fun, pastime through games and athletics. Sports is the only medium which can bring out in open many talent qualities of human being, under such condition it has to be considered whether it is possible to ignore the importance of sports in day-to-day life.

'A sound mind in a sound body', so goes the saying. Physical culture and sports play an important role in the harmonious development of the individual. A weak body is

the mother of all unhealthy developments even on the mental and moral planes. Indigenous games of the past tended to develop and bring to display individual excellence, while western games have been organised to inculcate team spirit of the best type.

### PHYSICAL FITNESS AND PERFORMANCE

Physical fitness has been defined by the Committee on Exercise and Physical Fitness of the American Medical Association (1966) as, "the general capacity to adopt and respond favourably to physical effort. The degree of physical fitness depends on the individual's state of health, constitution, and present and previous physical activity." Davis et al. (1961) have written,

"physical fitness is a product of many elements such as strength, skill, and so on. It must be remembered, however, that physical fitness is only one component of total fitness of the individual which also includes mental fitness, social fitness, and emotional fitness. Total fitness is really a capacity for living."

Astrand and Rodahl (1970) have avoided any narrow definition of physical fitness, but wrote,

"In a very broad sense, physical performance or fitness is determined by the individual's capacity for energy output (aerobic and anaerobic processes), neuromuscular function (muscle strength and technique) and psychological factors (e.g., his motivations and tactics)."

Although these definitions each emphasizes different aspects of fitness, there is no fundamental disagreement among them. Fitness as an overall concept appears to have many components, including intellectual and emotional as well as physical factors. These differ in relative importance from one period of life to another, depending on varying individual roles and responsibilities. The American Medical Association (AMA) definition of physical fitness states that physical fitness is the general capacity to adapt to physical effort. This means that, if no, or insufficient, physical effort is made, no adaptation will take place. The process of growth and development of the body is self initiating, and continues spontaneously until it reaches its maximum impelled by force that are inherent in the body, and that are predominantly genetically controlled.

In the second part of the American Medical Association (AMA) definition of physical fitness, it is stated that the degree of fitness will depend on the individual's state of health and bodily constitution. Although the individual's basic body constitution does not change during his life time, the relative composition of the body may be altered, usually by a change in the amount of fat. This may make it appear that the constitution is altered due to sometimes extreme alternation of the body contours.

Not all of the factors that affect human performance are susceptible to easy measurement. In addition to the psychological, there are anthropometric, psychological, environmental, technical, and social factors. To these may also be added the elements of chance, or coincidence which at some point allows some of all factors to exert maximum influence at the same time to produce a second breaking performance. Fortune favours the well-prepared, however, and it is seldom that a lucky circumstances produce a record performance by someone who had not already manifested the potential to achieve it. It almost goes without saying that it is all but impossible to produce performance that cannot be measured in numbers, either in time or distance or repetitions.

The social factors, that are to some extent for extending human performance to the establishment of new world records, have been pointed out by Graig (1968) and Buskirk and Tait (1965). They include a large population from which to draw a greater number of persons included in sports, greater prestige attached to sports participation, development of keen competitive attitudes, improve economic conditions, and the availability of better medical care. It seems likely that some of these factors may continue to bring about improvements for an extended period of time into the future, barring major changes in man's social organisation.

Nutrients obtained from ingested food provide blocks for the athlete's growth, development, and maturation, plus the fuel elements for routine energy expenditure and for initiation and maintenance of high level performance. Contracting muscle requires a continuing supply and replenishment of the substrates of fuels used to support contraction. It has been said that an athlete is no better than the adequacy of his nutrition (Buskirk, 1974).

Fortunately, with the many sources of good foods currently available there is no reason for the athlete to be inadequately nourished. The key for the athlete's nutrition as for every one else's is a diet balanced in all of the essential nutrients so that the body provided the necessary fuels and building materials. In selecting a diet the athlete can exercise considerable individuality. There is no 'best' balanced diet, for one balanced diet is likely to be as good as another. But there is no substitute for proper planning of a balanced diet, for an unbalanced diet consumed for several weeks can have dire competitive consequences. Even faithful participation in an excellent physical conditioning regimen cannot compensate for inadequate nutrition. Neither can a balanced diet alone compensate for poor skill development and training. Diet conditioning and training should be regarded as complementary. Similarly, a proper diet is no substitute

for the will to win, but a nutrient may indirectly aid that will.

Established nutritional practices fortified by knowledge gleaned from current nutritional research should provide the basis for dietary planning. The athletic team physician and the local dieticians, i.e., in hospitals, school, etc., are the persons usually most knowledgeable in nutritional planning and who can provide sound nutritional advice. In addition, trainers who are well read and/or who have been associated with college programmes are likely to have been exposed to discussions about good nutrition and should be able to provide nutritional counsel. Team physicians and trainers should be well aware of current dietary foods. Efforts should be made to clarify misrepresentation of nutritional facts in order to forestall initiation of costly and perhaps useless food habits.

## SPORTS SCIENCES

Man's physical activity and movement is as old as human existence. It played numerous roles: from struggle for existence to struggle for excellence. In this role playing, fundamental motor skills developed into various movement-patterns; at times involving basic living skills, sometime forming skills for leisure time pursuits, at times braving the unconquered, often applying skills for excelling the

sporting performance, but at every stage of human history physical activities provided an exciting outlet for human expression – often creature in nature (Bhattacharya, 1988).

Physical activity has throughout the ages been acclaimed for health and recreation. It provided fun and enjoyment, provided the youthful exuberance and provided the elderly care. But in modern days sports are gradually being replaced by technology in the name of betterment, variety, improvement and excellence. Sports are being used for the purpose of diplomacy, for the purpose of humanitarian work extending warm hands of the friendly humanity, and for the purpose of cultural awareness and health consciousness.

In the modern times the growth of sports and physical education programmes in any country is much dependent on the development of sport sciences (Muthiah, 1987). These sciences are known to have developed to a considerable extent in the developed countries. Kinanthropometry, exercise physiology, biomechanics, biochemistry, psychology, sociology, nutrition, medicine, pedogogies, methods of training or coaching and physical education are some of the well known sciences in this regard. The standard of sports and competitive performance can develop through integral approach by use of knowledge from both applied and basic sciences.

Although sports are a universal phenomena, ever in the most primitive societies, the spread of European culture around the world in the last three centuries has been chiefly responsible for developing the type of sports and the attitude toward sports which has led to extending the apparent limits of human performance. Track and field sports and swimming has given us types of activities where achievements are measured in times and distances which can be compared from year to year and from generation to generation (Ryan, 1974).

Perhaps the greatest single factor in the increase in sports participation has been the inclusion of physical education and sports programmes in the programmes of general education at all levels. The sportsman today, whether amateur or professional, does not have to apologize to any one for spending a good part, or indeed all of his time playing games. His exploits are recorded endlessly in newspapers, magazines on Radio and Television, and in motion pictures. The successful athlete today is a cultural hero who is received by Presidents and Kings and honoured with parades and medals. Professional athletes command some of the highest annual salaries paid in the United States today.

Sports in the socialist and communist countries have become important political factors in uniting populations at home, strengthening defensive forces and promoting those

countries in the international scene. With an increasing complex urban civilization, competition increases in its importance as a means of survival. The reflection of competitive attitudes developed in education, science, business, the professions, and even attaining social prestige is naturally felt in sports. This gives rise to such statements as that made by late Vincent Hombardi, a successful football coach, who told his players that "winning is not the most important thing, it is the only thing".

Improvement in average income levels and working conditions for many part of the world today mean that more time can be taken from the day for pursuit of leisure activities and some money is available to pay for them. As far as countries and communities are concerned it means more and better facilities for sport participation and more professional instructions and supervision available. It also means greater income from spectators for both amateur and professional sports which helps to make more and better sports programmes possible.

The limit of human performance have been extended in the past, and will be further extended in the future, by technical factors which aid the athlete in his efforts. These include the development of improved apparatus and equipments, provision of better facilities, refinements of measure-

ment techniques, and improvement in coaching techniques and systems.

The improved design of faster track surfaces, resistance to the infavourable effects of weather, such as Tartan track have helped to make for better running times indoor and outdoor meet. Improved design of indoor running tracks with wider surfaces, more scientifically banked curves, and fewer laps to the mile have also played a part. One of the most important, useful and practical aspects of elevating the efficiency of the athletes activities is the proper and scientific coaching and training of the athletes. It has been accepted by all that if the coaching and training are imposed or directed by experience trainers and coaches and if the athletes submit themselves whole-heartedly and fully to such coaching methods then they must attain perfection in their techniques.

### ANTHROPOLOGY AND SPORTS

The morphological characteristics of sportsmen and athletes are of interest to the anthropologists, for competitive sports demands the utmost from the body and it is therefore reasonable to expect to find in athletes demonstration of the relationship of structure and function. Athletic events are amenable to study, for they represent well-defined tasks with objective measures of success, winning, placing, time,

distance, points, etc. These tasks usually reflect one or more of the basic elements of physical performance, namely, speed, strength, stamina, suppleness and skill. The study of champion athletes therefore may provide information on the structural requirements for success in the specific tasks as well as measures of the differences between tasks. Moreover, the superior athletes of different specialties are of interest because of the information they provide about extremes of performance in a population (Carter, 1970).

It has been demonstrated by anthropologists that different body shapes and sizes tend to make their owner more or less suitable for certain types of physical activities. The person with a relative light body and long legs (ectomorphic type) make a good long distance runner. The man who is very short and stocky (endomorph type) has the potentiality of becoming a good weight lifter. The individual who is generally well proportional and of medium to tall height (mesomorphic type) may excel in a variety of sports, especially the team sports. In terms of functional capacity these three types as represented by individuals may exhibit a general state of fitness but each one is more fit for certain specific performance than others.

Size is a factor in all types of physical sports performance that involve the athlete accelerating his body,

moving it over a distance, lifting it, turning it, exerting maximum force and throwing. The relationship between body size and performance have been summarized very clearly and concisely by Astrand and Rodahl (1970). Taller persons have greater strength in proportion to their size and also have an advantage in jumping events, due to their higher centre of gravity, and in throwing events, since they can launch their missile from a greater height. They are slower in accelerating their bodies than shorter persons, and are at the disadvantage in lifting them if their weight is greater, which usually is.

Increase in height among the world's population are observed to have occurred sporadically, but with increasing consistency during the past two centuries (Shapiro, 1963). This process had accelerated greatly in the last 50 years. This increase in height has quite naturally been reflected in increase in average height among athletics in many sports, especially those sports where records of time and distance can be established. There is no question that the average increase in height of athletes in recent years has contributed to the establishment of new world records. Scientists who have studied this problem (recent growth spurt) are not in agreement as to the causes. Better nutrition, lower mortality and mortality rates in the early years due to control of



infectious diseases, more vigorous exercise in early years of life, earlier sexual maturity, and heterosis have all been implicated (Hathaway and Foard 1960, Tanner 1960; Ashcroft et al. 1966; Bakwin and McLaughlin, 1964). Although all these factors may have some part in increasing the average height, the most significant role has probably been played by heterosis, the mixing of diverse population. It has been demonstrated in other forms of life that the mixture of genes will produce increases in size in subsequent generations within the same species. There is certainly a tremendous variety of sub-species among homo sapiens, and the improvements in travels, communications, trade, wars, etc., have produced a satisfactory mixture in the past 300 years, particularly. It has also been noted that groups that have remained isolated during this period of time have not apparently shared the same growth (Shapiro, 1963).

In order to evaluate in full the candidate for sports participation, ascertaining the mere presence of or absence of organic diseases is not enough. It is necessary to evaluate his physical readiness for the particular sport event in which he plans to participate. Indications of the individual's physical readiness for sports may be found in many factors, including size, body build, flexibility, strength, cardio-muscular and respiratory fitness, etc. Accurate evaluation

of the body build of an individual may yield important facts relating to his physical readiness for sports participation. Factors to be considered are his age, height, weight, ponderal index, muscular development, amount of subcutaneous fat, somatotypes and posture. The importance of body build has not been given nearly as much attention in the medical literature as has been given to simple height-weight relationships.

Success of a player depends upon the physique and the training he gets. According to Hirata (1979), the best factors to be used as screening tests may be the age and physique, because when the training methods are equivalent to all, the suitable physique will be most important, i.e., if a person who has a suitable physique and takes the best training may become a champion. To produce peak performance from the biological viewpoint, one would expect to find in the sportsman, at various levels the expression of the effects of nature and nurture (Sodhi et al., 1988). Analysis of this characteristics of the athletes can help the scientists understand best performance by providing information useful in formulating strategies for training and for the explanation and prediction of performance. Such information about the sportsmen can helpfully contribute to healthy sport practice at regional, national as well as international levels.

Anthropometric, body composition and maturity characteristics of the athletes and sportsmen should be determined

to assess performance ability. The effect of physical training and coaching on the health of the athletes and players should be kept in mind during the training programme. The body infirmity or physical defect should be assessed. Otherwise, those on-toward effects may be met with those athletes who are suffering from diseases or deformities. One has to note whether the athletes and sportsmen are advanced in skeletal or sexual maturity or retarded and also whether they differ in height, physique and body composition. Apart from the body configuration, skeletal maturity of the sportsman is also related to physical performance.

The anthropometric dimensions selected for comparison depend on the body weight, stature, arm and calf circumferences, and skin-folds. Body composition is estimated by fatness and relative fatness is given more importance and this is considered by nothing but the ill effects of obesity or over weight on physical performances. The 'under weight' based on leanness or thin build is also taken as a determinant of the body composition.

### PHYSIQUE

Interest in classifying human physique dates from at least the time of Hippocrates (460-370 B.C.), and the various systems developed since then have been well documented in summaries reported in Tucker and Lessa (1940) and Sheldon

et al. (1940). A problem in the classification of body shape is that it is difficult to measure and quantify, although it is relatively simple to observe (Tanner, 1953). Part of the problem relates to measurement (anthropometric versus observation (anthroposcopic or photoscopic) procedures. Anthropometric quantification of body types has been described by many investigators and is exemplified by the methods of Viola (1932), Lindegard (1953), Behnke (1961) and Conrad (1963).

The notion of classifying physique into some meaningful system has been the stimulus for repeated efforts in this direction. If, for example, behavioral, disease, and functional characteristics of human can be associated with certain physiques, then knowledge and understanding of those characteristics and their manipulation can be enhanced. Damon (1970) defined 'constitution' as the sum of a person's innate and relatively fixed biological development. However, Damon (1970) states that,

"to physical anthropologists, psychologists, and behavioral scientists generally, constitution means physique in relation to environmental adaptation, disease or behaviour. As such, constitution is one application to man of the structure-function relationship, the central concern of physical anthropologists. In addition, physique can be correlated with other characteristics of the individual partly because it is 'obvious and easily described'".

The strong constitutional bias of physique lasted until the 1950s. Thereafter, the shift in thinking has been from fixed classification to plasticity of humans and is supported by Pollitzer (1981), Hulse (1981), Hunt (1981), who see more emphasis on process and cause than classification, i.e., a shift from static to the dynamic viewpoint.

### KINANTHROPOMETRY

The emergence of a relatively new scientific specialization called Kinanthropometry provides a convenient framework for the study of athletes. Kinanthropometry is a synthesis of the Greek words ('kineein' means to move, 'anthropos' means man, and 'metreein' means to measure) is defined as "the study of human size, shape proportion, composition, maturation and gross function in order to help growth, exercise, performance and nutrition". (Ross et al., 1980).

According to Carter (1985), a relatively new and comprehensive approach to assessment of physique is through kinanthropometry which evaluates the physical structure of individuals in relation to gross motor performance. The term kinanthropometry is derived from morphometry which is the measurement of shape, and form of man. It is the quantitative study of size, shape, proportion, composition and maturation in relation to gross function (Carter, 1985).

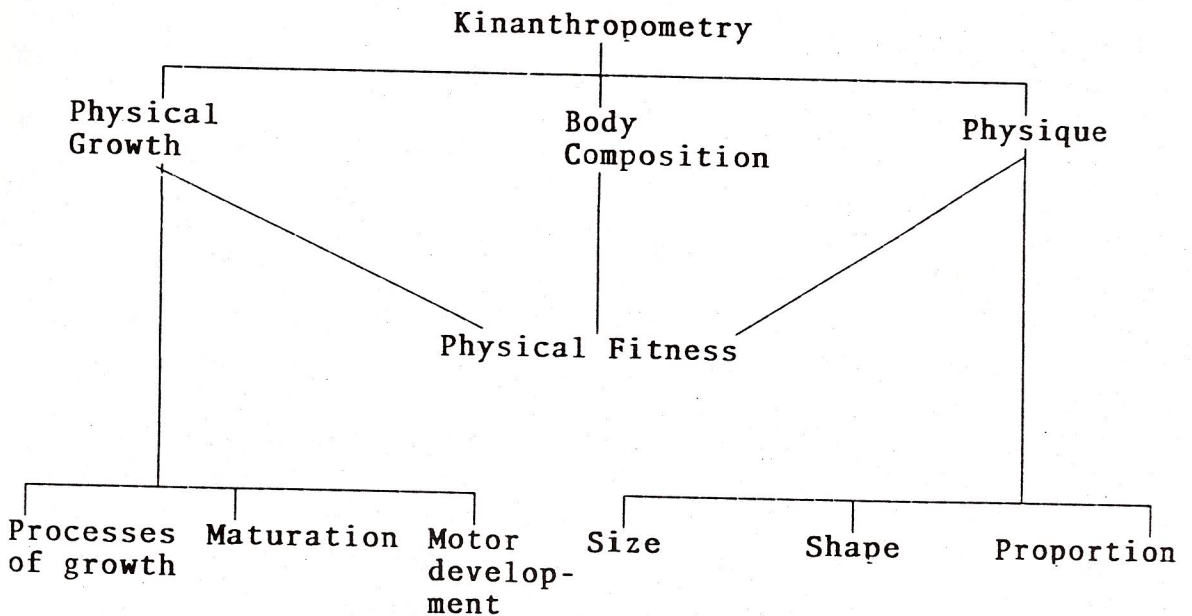
The constitution of International Society for the Advancement of Kinanthropometry (ISAK) also elaborates explanation of the science. Accordingly,

"Kinanthropometry is a scientific specialization dealing with the measurement of man in a variety of morphological perspectives, its application to movement and those factors which influence movement, including, components of body build, body measurements, proportions, compositions, shape and maturation, motor abilities and cardiorespiratory capacities, physical activity including recreational activity as well as highly specialized sports performance".

Defined as such, kinanthropometry is a scientific specialization closely allied to physical education, sports science, sports medicine, human biology, auxology, physical anthropology, gerontology, ergometry and several medical disciplines. (Sodhi, 1991).

Kinanthropometric investigations have been conducted on the Olympic athletes during the recent Olympic Games. The different kinanthropometric characteristics examined include investigations of their size and shape, using large number of variables according to sports and events (Carter, 1982, 1984). The term kinanthropometry in its present connotation was probably first used in 1972 by Ross et al. (1980). However, a more common term, used especially in Europe, was Sports Anthropometry (Tittel, 1978; Tittel and Wutscherk,

1972). Of course, the use of the term was incorporated in a Symposium of Kinanthropometry and Ergometry at the International Congress of Physical Activity Sciences held in Quebec city in 1976. In his keynote address about its scope, Ross (1978) referred to kinanthropometry both as "an emerging scientific technology" and as "an emerging scientific discipline". Sodhi and his associates (1988) gave an account of the main organs of Kinanthropometry as follows:



Now-a-days it is apparently clear that the term 'Kinanthropometry' has been gaining popularity since its use in many international and national conferences. With the advancement of the science of Kinanthropometry has taken a strong footing at the international level. Even in India

special scientific sessions on Kinanthropometry were arranged in the First (1985) and Second (1986) National Conferences of Indian Association of Sports Scientists and Physical Educationists (IASSPE).

So, it is essential to examine a sportsman from every possible aspect. This is in order that he wins in any sport event at the local, state, national or international level. To achieve success in this objective one has to examine the best sportsmen at each level. Estimation of the Kinanthropometry characteristics of these sportsmen provides a valuable reference point in relating human structure and function. In order to develop science of Kinanthropometry in India, a National Working Group on Kinanthropometry (NWGK) was established at Lakshmi Bai National College of Physical Education, Gwalior, in 1985.

### **SOMATOTYPING**

Physique is measured by different procedures. Surface dimensions, body height and weight, and dimensions of body segments are measured by anthropometry. The study of body composition involves a variety of methods: X-rays, densitometry, hydrometry, and skinfold thickness among others. While many of these procedures are precise, they necessarily given values for only a single parameter; they do not evaluate total body form. A technique attempting the latter was des-

cribed by Sheldon et al. (1940, 1954) who called it 'Somatotyping'. Somatotyping can best be thought as a numerical shorthand method of describing human physique. The technique is used as a means of assessing body shape and composition independent of size. It has been applied in its original and modified forms in a variety of ways for measuring the effects of nutritional insult on physique (Lasker, 1947) to the description of many different groups and individuals including children, athletes etc. (Parnell, 1958; Heath and Carter, 1966).

Somatotyping is a valuable technique to quantify the overall morphological conformation of human body for which many characteristics can be summarised. It is also a generic term that means the quantitative description of the morphological conformation and composition of the body. It is an appealing concept since a simple rating can be given for any particular body form.

#### HEATH AND CARTER SOMATOTYPING METHOD

Heath and Carter (1967) further objectified Heath's system by incorporating anthropometric measurements and redefining somatotype and the component scales. These definitions are as follows.

1. A somatotype is a description of present morphological conformation. It is expressed in a three numeral rating,

consisting of three sequential numerals, always recorded in the same order. Each numeral represents evaluation of one of the three primary components of physique which describe individual variations in human morphology and composition.

2. First component (or endomorphy) refers to relative fatness in individual physique; it also refers to relative leanness. That is, first component ratings are evaluations of degrees of fatness which lie on a continuum from the lowest recorded values to the highest recorded values.

3. Second component (or mesomorphy) refers to relative musculo-skeletal development per unit of height. Second component ratings are evaluations of musculo-skeletal development which lie on a continuum from lowest to highest degrees recorded. The second component can be thought of as Lean Body Mass relative to height.

4. Third component (or ectomorphy) refers to relative linearity of individual physique. Third component ratings are based largely, but not entirely, on  $\text{height}^3/\text{weight}$  ratios. These ratios and third component ratings are closely related, so that at the low ends of their distributions both connote relative shortness of the several body segments, and the high ends connote elongation or linearity of the several

body segments. Ratings evaluate the form and degree of longitudinal distribution of the first and second components.

The definitions and concepts of the three somatotype components are derived in part from interpretation studies of body composition. Extremes in each component are found at both ends of continua. That is, low first component ratings signify physiques with little non-essential fat, while high ratings signify high degrees of non-essential fat. Low second component ratings signify light skeletal frames and little muscle relief, while high ratings signify marked musculoskeletal development, as in many athletes. Low third component ratings signify short extremities and low  $\text{height}/\sqrt[3]{\text{weight}}$  ratios, while high ratings signify linearity of body segments and of the body as a whole, together with high  $\text{height}/\sqrt[3]{\text{weight}}$  ratios. Extremes at both ends of all three somatotype component ranges connote rarity of occurrence. In the majority of cases ratings of all three components tend to be nearer to the mid-range than to the extremes.

Several authors, Cureton (1947, 1951), Parnell (1954, 1958), and Damon et al. (1962), have demonstrated the feasibility and validity of applying anthropometric measurements to the estimate of a somatotype using Sheldon's method. Recently Heath and Carter have developed an anthropometric estimate for their method of somatotyping. The utilization of anthro-

pometry in obtaining a somatotype rating has certain inherent advantages.

- (a) It provides an objective method of somatotyping.
- (b) In the absence of a photograph, it is the best estimate of a criterion somatotype rating.
- (c) When a somatotype photograph is available, it provides an objective starting point for a combined anthropometric plus photoscopic rating by different observers.
- (d) An estimate of the subject's somatotype can be obtained in the field quickly and accurately without having to wait for development of photographs and rating by a criterion rater.
- (e) The subject does not have to undress completely for the measurements, or for a somatotype photograph.
- (f) Partly as a consequence of the previous advantage, subjects can be somatotyped who would not otherwise be available because of the objection to being photographed, either nude or partially nude.
- (g) The anthropometric measurements in addition to height and weight can be utilized for other types of analysis and evaluation of body structure.
- (h) The anthropometric measurements provide a more precise measure of change in the somatotype components than a subjective rating.

#### CONRAD'S METHOD OF SOMATOTYPING

Conrad (1963) described a modified method for somatotyping. He classified the human body considering the body growth and muscular mass. His method for studying the body type involves six anthropometric measurements. Conrad's Method for studying body type has been very popular in German Democratic Republic where it is frequently used to study the

somatotype of athletes and sportsmen. The method has been used for both sexes.

According to Conrad's Method, the constitutional types are not seen as polar extreme basic types but they are rather valued as deviations in a normally distributed totality in which not extreme forms, but the means represent the normal, and according to the laws of normal distribution, the most frequent.

Any normal distribution shows two poles excluding one another influenced by growth tendencies respectively. According to Conrad, these are leptomorphic and pycnomorphic types. The leptomorph physique deviates from the mean by an emphatic upward growth and a limited depth growth. The pycnomorph physique deviates from the means by an emphatic depth growth and limited upward growth.

However, the athletic body build result mainly from a functional adaptation defined by a specific character of the physique. It is possible that both growth tendencies excluding each other (lepto and pycno) and the forms in between them, can adopt within the limits of the individual reaction capacity. Accordingly, both body types are athletically shaped joining characteristics in an opposite trend and may be formed non-athletically.

Conrad calls these forms 'hyperplasia' and 'hypoplasia' respectively. In which the degree of leptomorph and pycnomorph are based on the basis of metric index. Whereas the degree of hyperplasia and hypoplasia are based on the plastic index. The metric index is estimated from the body height, chest depth and chest breadth. The value of plastic index is estimated from biacromial breadth, forearm circumference and hand circumference.

#### PRESENT STUDY

The present study proposes to report the somatypes of Meghalaya football players (men) participating at the local District and State level. Many such studies have been conducted on players of different games in UK, USA, USSR, Germany, etc. While there are only a few somatype investigations on Indian players of various games in some parts of the country (other than North-East India), no one has attempted similar study upon Meghalaya (Khasi-Jaintia) sportsmen for any sport, let alone Football - the most favourite sport of present times. Further, data on athletes generally support the hypothesis that athletes are somatotypically different from the general populations. In many studies, athletes in reference populations were not separated from samples in their entirety before comparisons were made.

Experts in the fields of sports science and administration have realized that identification of talents to be

based on scientific methods (Sports Authority of India, 1990). In a study of somatotype of players or athletes, one needs to ask, "who are to be considered champions". A champion by definition is unique within his group. He is found at the local, state, national or international levels. At any of these levels he becomes a champion by his ability to defeat others, by his individual performances in competition or by being a member of a champion team (Carter, 1970).

In view of the above, the following objectives are identified for the proposed study.

- i) to report the somatypes of football players,
  - ii) to examine differences in the somatypes of football players and the general population,
  - iii) to compare the present data with that reported in the literature, and
  - iv) to make suggestions in the light of the above.
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