

AN ANTHROPOLOGICAL STUDY OF BASKETBALL
PLAYERS AMONG KHASI WOMEN OF
SHILLONG

Department of Anthropology

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CERTIFICATE

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CERTIFICATE

Certified that the subject matter of the dissertation is the record of work done by ILINDA BLAH, that the contents of her dissertation entitled "AN ANTHROPOLOGICAL STUDY OF BASKETBALL PLAYERS AMONG KHASI WOMEN OF SHILLONG" did not form a basis of any previous degree to her or to the best of my knowledge to anybody else, and the dissertation had not been submitted by her for research degree in any other University.

SHILLONG

THE 30th Nov. 1993

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CHAPTER I
INTRODUCTION

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INTRODUCTION

WOMEN AND SPORTS

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 varies from group to group and from time to time. In Western society, the attitudes and ideals regarding the women's role in the family and other social institutions, including sports, that emerged during the Victorian era in the late 1800s were consistent and distinctive.

For girls and women to participate in sports was contrary to the Victorian ideal. Sports would take a woman out of home to engage in vigorous activity. It would place a woman in a situation where modesty might be compromised, where emotional control might be jeopardized, and where overall propriety could be endangered. It was also feared that attracting a mate and child bearing could be hindered or prevented by injuries to the face and reproductive organs resulting from sport accidents (Sneider, 1983).

Although women were kept away from competing, under

the influence of Hippodamus the Mereca games were organised to provide competition for women. These games were held secretly every four year, midway between the Olympics. Although the status of women improved somewhat after the birth and ministry of Jesus Christ, it was not until the end of the 19th century that women could compete seriously in sports. Yet social definitions still prescribe and limit the range of athletic participation for girls and women. The 'appropriateness' of the type of sport continues to reflect the tenets of the Victorian ideal of femininity. Metheny (1965) has provided an analysis of how the appropriateness of a sport for women continues to reflect those historical ideals.

Even the first modern Olympic games did not include events for women. In 1900, equestrian events and tennis were for the first time introduced as events for women at the Paris games. Although one of the most interesting developments in sport during the decades of the sixties and seventies has been the tremendous growth in number of women taking part in competitive athletic performance has not been studied as intensively as in the case of men.

Women nowadays are taking active participation in competitive sports. Women for a long time took part in gymnastics, tennis, badminton, but nowadays they are

taking part in more tough games like Football, Basketball, Volleyball, Hockey, Marathon, Swimming, Running, Skiing, Skating etc. and even in power lifting and endurance games. Thus the technique of physical culture and exercise have been adopted by women.

According to Thakur (1984), the girls of pre-school age must be encouraged to participate in games requiring physical activity like boys and this will enhance the self confidence among the girls which will naturally provide them to attain perfection in their later life. Anderson (1984) opines that women must be given the same encouragement and opportunity to participate in the same vigorous activities as young men with possible exception of collision sports activities.

IMPORTANCE OF SPORTS

Sports activities bring people of different regions and different cultures together and the importance of sports specially for the younger generations cannot be over-emphasized. Sports and games provide a very healthy form of recreation and 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 competitive nature though their recreative values cannot be under-estimated or denied. Sports nowadays have changed

a lot and are more scientific and mass oriented, well organised, 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 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 planes. In the animal kingdom one finds that the young ones take to play and physical exercise with enthusiasm. In the human kingdom it ought to be much more so. 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 (Blah, 1988).

Physical activities provided an exciting outlet for human expression – often creative in nature. Physical activities have throughout the ages been acclaimed for health and recreation. It provided fun and enjoyment, youthful exuberance and elderly care. But the natural urge, power, and the natural surface that groomed the participants

through the centuries from primitive to modern days are gradually being replaced by technology in the name of betterment, variety, improvement and excellence. No longer it is fun and enjoyment or youthful exuberance or elderly care, sports are being used for the purpose of diplomacy, the purpose of humanitarian work extending warm hands of the friendly humanity, and for the purpose of cultural awareness and health consciousness. The Goodwill Games emerged when boycotts after boycotts started crippling the Olympic Games. So Games are being used as a political force. The Goodwill Games have extended the hand of goodwill, cordiality, and fraternity amongst the nations of the world. Recently, we saw a unique event - the Earth run. In this Sport-Aid programme, sportsmen, musicians, artists, intellectuals and people from all walks of life over the world joined hands, participated in the run on the streets of the world to express an unique sporting sympathy, fellow feeling, and solidarity with Africa's hungry millions. The 'Health-Run' at New Delhi in early January 1988, was organised for promoting health consciousness among the masses (Bhattacharya, 1988).

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 especially 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 sportmen (Chu, 1982).

FACTORS AFFECTING PERFORMANCE IN SPORTS

Not all the factors that affect human performance are susceptible to easy measurement. In addition to the psychological, there are anthropometric, physiological, 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 the 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 lucky circumstances produce a record performance by some one 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
education at all levels.

extending human performance to the establishment of new world records have been pointed out by Graig (1968) and Biskirk and Tait (1965). These include a larger population from which to draw a greater number of persons included in sports, greater prestige attached to sports participation, development of keener competitive attitude, improved 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.

Although sports are a universal phenomena, even in the most primitive societies, the spread of European culture around the world in the last 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 have 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 participations has been the inclusion of physical education and sports programme 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/her 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.

Improvement in average income levels and work conditions for many part of the world today mean that more time can be taken from the day for pursuit of leisure to pay for these. As far as countries and communities are concerned it means more and better facilities for sport participation and more professional instruction and supervision available. It also means greater income from spectators for both amateur and professional sports which help to make more and better sports programme 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 measurement techniques, and improvement in coaching techniques and systems.

The improved design of faster track surfaces, resistance to the unfavourable effects of weather, such as the Tartan Track have helped to make for better running times indoor and outdoor meets. Improved design of indoor running tracks with wider surfaces, more scientifically banked curves, and fewer laps to the mile have also played a role. 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 all that if the coaching and training are improved or directed by experience trainers and coaches and if the athletes submit themselves whole heartedly and fully to such coaching methods than they must attain perfection in their technique.

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

Due to a growing change in the competitive philosophy of sports, a rapport has developed among sport scientists, team physicians, athletic trainers, coaches and athletes to discover modern scientific techniques in terms of selection of athletics best suited to the activity and to derive new tactics and training methods (Ryan, 1974).

Nutrients obtained from ingested food provide the building 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 replacement of the substrates of fuel used to support contraction. It has been said that an athlete is no better than the adequacy of his nutrition (Buskirk, 1974).

Fortunately, with many sources of good foods currently available there is no reason for the athlete to be inadequately nourished. The key for the athlete is nutrition as for every one else's is a balance diet, balance in all the essential nutrients so that the body is 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 balance diet is likely to be as good as another. Neither can a balance 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 physicians and the local dieticians, i.e., hospitals, schools, 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.

ANTHROPOLOGY AND SPORTS

The morphological characteristics of sportsmen and athletes are of interest to the anthropologists, for competitive sports demand the utmost from the body and it is therefore reasonable to expect 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 specialities 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 the owner more or less suitable for certain type of physical activity. The person with a relative light body and long legs (ectomorphic type) has the potentiality of becoming a good weight lifter. The individual who is generally well proportioned and of medium to all height (mesomorph) may excel in a variety of sports. In terms of functional capacity three types of 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 athletics accelerating his body, moving it over a distance lifting it, turning it, exerting force and throwing. The relationship between body size and performance have 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 launched 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.

Anthropometric body composition and maturity characteristic of the selected athletes should be determined to assess their performance ability. One has to know whether the athletes differ in height, physique and body composition. Indications of individual's physical readiness for sports may be found in many factors, including size, body build, flexibility, strength, cardiovascular and respiratory fitness etc. Accurate evaluation of the body build may yield important facts relating to his physical readiness for sports participation.

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 athletes in athletics in many sports, especially those sports where records of time and distance can be established. There is no questions 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 vigorously exercise in early years of life, earlier sexual maturity, and heterosis have all been implicated (Hathaway and Foard, 1960; Tanner, 1960; Aschroft 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 meterosis, 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 their period of time have not apparently shared the same growth (Shapiro, 1963).

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 his 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 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 useful information 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.

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).

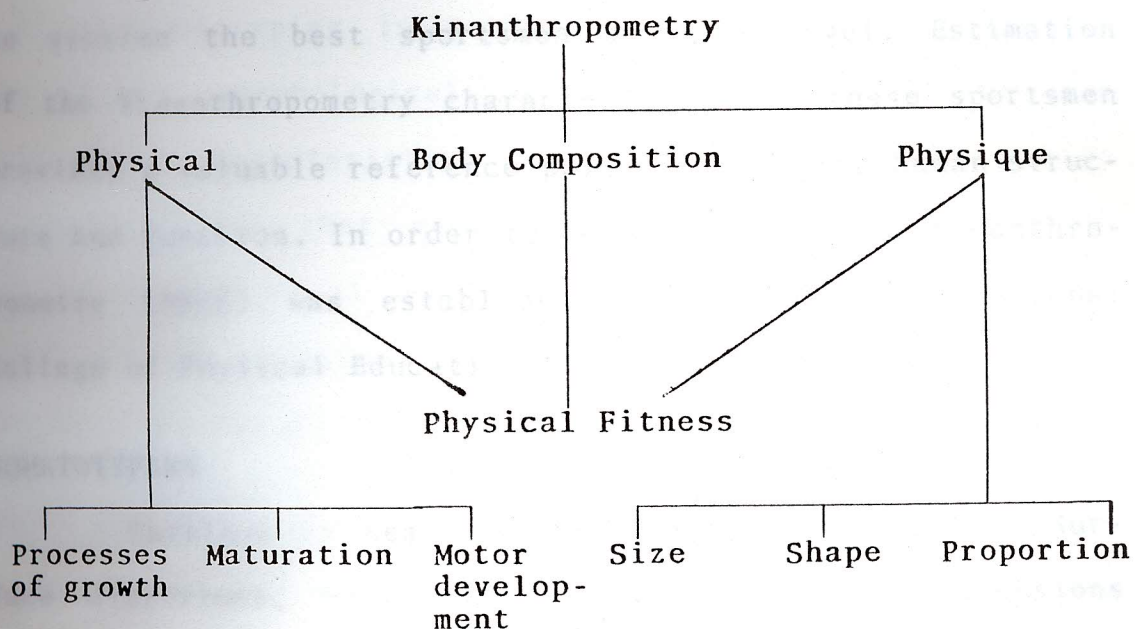
According to Carter (1985), a relatively new and comprehensive approach to assessment of physique is through kinanthropometry which evaluates the physical structure of individuals in relation to gross motor performance. The term kinanthropometry is derived from morphometry which is the measurement of 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 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 (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 give values for only a single parameter; they do not evaluate total body form. A technique attempting the latter was described 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 $\text{height}/\sqrt[3]{\text{weight}}$ 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 musculo-skeletal 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 anthropometry 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 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 athleti-

cally 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 body size and shape (somatotype) and the influence of various factors on the performance of Khasi women basketball players participating at the school, college, local, ex-state 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 somatotype investigations on Indian players of various games in some parts of the country (other than North-East India). Dkhar (1991) has conducted similar study on football players of Meghalaya but no one has attempted similar study on Khasi sports women for any sport, let alone basketball – the most favourable sport of the 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 and 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 body size and shape (somatotypes) of basketball players.
- ii) To examine the differences in the body size and shape of basketball players and the general population.

- iii) To compare the present data with that reported in the literature.
- iv) To evaluate the influence of various factors on the performance of basketball players, and
- v) To make suggestions in the light of the above.