CHAPTER I
INTRODUCTION
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INTRODUCTION

The human physique across the centuries has been the subject of discussion with the scientist, artist and even layman. However, it has not been possible for any of these to say clearly as to what physical characteristics are more suited to what type of performance task. Subjective judgement and hypothetical views have been expressed, but there has been lack of empirical data to substantiate various theoretical view points. Perhaps no serious attempt has been made through either systematic or experimental study to relate performance with certain physical characteristics. It would be a million dollar question if one could point out very precisely as to what contributed by way of physical characteristics to the elite performance in a game or sport. All most all the game and sports are base upon such fundamental skills that do require typical characteristics of physique so thickly associated with performance.

With reference to the Olympic level performance, Tanner (1964) observed that lack of proper physique may make it almost impossible for an athlete to reach that degree of success. In general, the most productive studies have been of high level performers at national and international levels. Theoretically we could expect those who are most successful to have the appropriate structures commensurate with their performance task; therefore, examination of differences between these structures and tasks will increase our understanding of the importance of aspects of physique.

Morphology is the science of structure and form without regard to function. It is a biological dictum that structure defines function and function defines structure, so there is a relationship between the two. Further morphology is not only a study of material things, but has its dynamic aspect under which we deal with the interpretation in terms of force, of the operation of energy. It is pointed out that matter as such produces nothing, changes nothing and does nothing, yet cells can never
act as matter alone, but only as seats of energy and as centers of force. Thus morphology or physique is related to the physiology and biomechanics of the human body in motion, levers and forces which are corner stones of human movements and their quantification is the foundation for building a more complete knowledge of human performance. (Thompson, 1966)

Measurement of the morphology of athletes has largely developed during the past century. Since then most studies have focused on descriptions of athletes, comparisons of athletes between and within sports, relationships of physique to physiology and bio-mechanics and selection of young athlete for training. Absolute and relative size, somatotypes, composition and maturation are morphological factors that may limit human performance. It is inferred that athletes who already have or acquired the optimum physique for an event are more likely to succeed than those who lack these characteristics. Quantification of physique through kinanthropometry can provide a better basis for understanding the limits related to bio-mechanics, physiology and psychology of performance. The science of morphology is considered to be the most important science to understand structural basis of sports performance in different games and sports. It is very important for the coaches and the teachers of physical education to understand the principles of growth and development, which governs the optimum potentiality of human performance. The science of growth and development helps us to study different aspects of sports performance and its knowledge can be utilized to achieve top level performance from each individual athlete in all games and sports.

Motor development is the most important aspect of growth and development. The accurate assessment and evaluation of motor abilities definitely helps in identifying the potentially talented children and also in formulating scientific training programs for children and youth of various ages so that optimum performance can be achieved by every sportsmen at right age and also to preclude any negative or harmful effect of training on them.
Growth is a creative process the transformation of a zygote into a fetus, an embryo, a neonate, a child and an adult is nature's finest feat of creativity which brings about structural changes and marked behavioral variability in the individual over a period of time. As the individual moves from one stage of growth to another, something is added to his cognitive and conative and affective behavior. Growth is truly a building up process which manifest all aspects of human personality.

The term growth and development are used interchangeably. Growth is one aspect of development and refers to the 'increase' caused by biological process in which the organism becomes bigger in size, volume and heavier in weight. Starting the life almost from an invisible dot, the human organism grows to be more than 5 feet in height and more than 150 pound in weight. Growth indicates enlargement of cells, fibers and muscles, elongation of skeleton and increase in the general volume of the body. Development in the wider term indicates advancement, more unfoldment, a progressive change, a sort of growing forward to greater maturity. Development is more than a concept. It can be observed, appraised and even measured in three manifestations: Anatomic, physiology and behavioral.

Development is often referred in qualitative terms such as changes in the biological make up of cells and tissues and as alterations in the normal metabolic and functional characteristics of organism as they mature. Thus the assessment of development requires measurements that are indicative of the organism's integrative, behavioral and physiological characteristics. Such measurement are designed to gain insight into the changes in the adaptive powers and response capabilities of the organism as it progresses towards maturity.

During the elementary years the child has been growing less in height each year until nine years in case of a girl and eleven years in case of a boy. Generally girls grow faster from 9 to 12 years with a peak in the twelfth year. In weight, the school aged child increase momentum slowly
each year until girls reach a peak at about twelve and boys about fourteen years. (Forest, 1984)

A knowledge of how children grow i.e. the sequential changes and the variability in the rate of growth from time to time and from child to child should a basis of understanding of growth and development pattern of individual child to every adult who lives and works with children. Thus the teacher can stage the child, fit his activities according to his maturity and ratio of physical growth, development and provide him with necessary programmes of physical education and sports for his or her better growth.

At adolescence, girls are usually two years ahead of boys in bone ossification because estrogen hasten the closing of the growth plates in the long bone. Therefore the female has a short growth period. (Kamlesh, 1992)

Late maturing girls have a longer period of skeletal growth than early maturing girls and consequently greater height and longer legs and arms; in terms of general appearance of skeleton, the male is more rugged, bones are more massive and dense, long bones are longer, and joints are larger and have a more extensive articulate surface. Males have higher body density value than female at all ages and consequently lower percentage of body fat.

Physiological differences are often due to difference in such factors as body size and composition. Thus morphological and physiological differences are very much interrelated and may produce variation in performance between the sexes. Women have lower absolute maximal aerobic capacity and muscular strength than men. Physiological differences are smaller in well trained male and female athlete within the same sport than within the general population. This implies that much of the variation between the sexes may be attributed to behavioral factors as well as strictly biological differences.

Many functional differences are the result of basic differences in body size and composition. Because the cellular mechanism that control the physiological and biochemical responses to exercise are identical for
both sexes. Slightly different quantitative response can result in significant performance differences. Men are usually stronger than women because they have more muscle mass. Physical fitness test scores show that boys outperform girls in all measures except flexibility. Motor skill test scores indicate that sex differences exist at an early age.

There are many factors which influence growth. Basically heredity furnishes the reference point along which growth and development takes place. Heredity influences the growth and development of an individual, however, there are wide limits within which environmental factors also become influential. Perhaps heredity does set the boundaries but environment and the impact of nature dictate how one falls within this limit. Environmental factors which can significantly influence the growth and development are: nutrition, climate, outdoor living conditions, fresh air, sunshine, exercise and rest.

"According to an Arabic proverb "Health is a crown on the well person's head but only the sick seem to see it." Nieman and Facsm rightly said, "Health promotion is defined as the science and art of helping people to change their lifestyle to more towards a state of optimum health." The emphasis on health promotion was inspired in the past by the world Health organization. As per WHO - "Health is a complete state of physical, mental and social well being of a person and not merely an absence of disease or infirmity." These four aspects of health may be achieved through physical education, because the main objective of physical education is to make an individual physically fit, mentally sound, emotionally balanced, and socially adjusted within the society.

"To develop health and fitness through the medium of exercise, recreation, games and sports is one of the prime objective of physical education. Today a large number of people from childhood to old age are performing regular physical activity for the purpose of improving health and physical well being. Physical fitness is an important part of the normal growth and development of an individual to lead an active lifestyle. The health and fitness of the people are very deplorable, because large
number of people all over the world are still victims of obesity, inappropriate heart functioning, low back pain, inadequate muscular strength and endurance. Moreover majority of people are suffering from mental tension and stress as a result of sedentary life style and poor state of physical fitness.

Different philosophers and sports scientists have expressed their views regarding the importance of physical fitness in human life. Shree Rama Krishna said, “He who is soft and weak minded is like the puffed rice soaked in milk is good for nothing. He cannot achieve great success. But the strong and vivid one is heroic. He can accomplish everything in life.” The Greek Philosopher and thinker, Aristotle stated, “Body is the temple of the soul and to reach harmony of body, mind and spirit, the body must be physically fit.” Willman said, “Physical fitness is essential not only in terms of general health but also for special physical requirement for competitive sports and certain highly specialized and demanding occupation.”

According to Hastad and Lacy, “The Health Related physical fitness domain is characterized by those aspects of physical fitness that affect an individual’s functional health and physical well being. It is becoming an accepted practice for physical fitness testing to emphasize health related components, including body composition (ratio of leanness or fatness) cardiovascular efficiency, muscular strength and endurance and flexibility of lower back and posterior area.”

Physical fitness on the other hand is defined as the ability to carry out daily tasks with vigor and alertness without undue fatigue and with ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies.

Physical fitness and wellness are closely associated and are contributory to each other. Physical fitness contributes significantly for a healthy lifestyle. A combination of physical fitness program with a healthy life style program has been recommended by the experts as a wellness
approach to good health and quality of life. A physically fit person seems to enjoy a healthy lifestyle.

Physical fitness can be classified into two categories namely; health related physical fitness and motor skill related physical fitness. Health related physical fitness could be defined as a scientific body of positive effects of regular and vigorous exercises with the prevention of degenerative diseases, such as coronary heart disease, obesity and various musculo-skeletal disorders. (Uppal, 1992)

Health related fitness refers to the state of physical and physiological characteristics that defines the risk levels for premature development of disease conditions presenting a relationship with the sedentary mode of life. Important determinants of health related fitness include such factors as body mass for height, body composition, subcutaneous fat distribution, abdominal visceral fat, bone density, strength and endurance of abdominal and torso, lumber musculature, heart and lung functions, blood pressure, maximal aerobic power and tolerance to submaximal exercise, glucose and insulin metabolism, blood lipid and lipoprotein profile. A favorable profile for these various factors presents a clear advantage in terms of health outcomes as assessed by morbidity and mortality statistics. The components of health related fitness are numerous and are determined by several variables including the individual's pattern and level of habitual activity, diet and heredity. Most authorities agree that from a health point of view, there are four components of physical fitness. These components are cardio-vascular endurance, muscular strength and endurance, flexibility and body composition.

Accurate information regarding women is either severely limited or not sufficiently indexed to be readily available to people who are especially interested in such matters. Although considerable material is available on growth and development patterns and motor fitness composition of men relatively a very scanty attempts have been made on girls or women. Keeping the above facts in mind, the researcher felt a need to undertake a
research project to investigate cross sectional analysis of health related
physical fitness and growth pattern among girls of 5 to 15 years of age of
Madhya Pradesh.

**Statement of the problem**

The purpose of the study was to investigate cross sectional analysis
of health related physical fitness and growth pattern among girls of 5 to
15 years of age of Madhya Pradesh.

**Sub problems of the study**

1. The sub problem of the study was to construct health related physical
   fitness norms for girls of 5 to 15 years of age of Madhya Pradesh.

2. The another sub problem of the study is to construct norms on the
growth patterns for girls of 5 to 15 years of age of Madhya Pradesh.

**Delimitation's**

1. The study was delimited to the girls of 5 to 15 years of age
   undergoing school education in urban cities of Madhya Pradesh i.e.
   Raipur, Durg, Bilaspur, Gwalior, Bhopal, Indore, Ujjain, Jabalpur,
   Sagar and Rewa.

2. The study was further delimited to assessment of health related
   physical fitness by using AAHPERD test (1988) consisting of the
   following items.
   
   (a) Endurance run (1/2 mile run)

   (b) Muscular endurance (flexed knee sit-ups in 60 sec.)

   (c) Muscular strength (modified pull ups)

   (d) Flexibility (sit and reach test)

   (e) Body composition (skin fold measurements of triceps and calf
       muscles)

3. The study was further delimited to the following growth and
development variables such as; height, weight, skin fold
measurements of biceps, triceps calf, subscapula and superiliac, biceps girth, calf girth, bone diameters of femur and humerus.

4. Somatotype rating method of Heath and Carter was used to classify the physique into endomorphy, mesomorphy, and ectomorphy of subjects and hence could be considered as one of the delimitation.

5. The study was further delimited to the measurement of fat by GMP Skinfold caliper, Bone diameter by sliding caliper of Anand Agencies, Pune.

Limitation

The geographical variability in living condition of subjects residing in various cities of Madhya Pradesh, different socio economic status, variations in life style, daily routine of child, nutritional habits of subjects might be considered as some of the limitations of this research study.

Hypothesis

It was hypothesized that there shall be no significant differences in the health related fitness variables among girls of 5 to 15 years of age of Madhya Pradesh.

Sub Hypothesis

It was hypothesized that there shall be no significant differences in the growth variables among girls of 5 to 15 of age of Madhya Pradesh.

Definition and Explanation of the term

Physical Fitness:

The World Health Organization defined it simply as “the ability to perform muscular work satisfactorily”.

The American College of Sports Medicine has proposed that “fitness is the ability to perform moderate to vigorous levels of physical activity without undue fatigue and the capacity of maintaining such ability throughout life.”
The President council on physical fitness and sports has offered one of the most widely used definitions describing physical fitness as the “ability to carryout daily tasks with vigor and alertness without fatigue and with ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies.”

**Health Related Physical Fitness**

The American College of Sports Medicine has defined Health Related Physical Fitness as “a state characterized by an ability to perform daily activities with vigor and a demonstration of traits and capacities that are associated with low risk of premature development of hypokinetic diseases (i.e. those associated with physical activity)”. Tanners defined “health related physical fitness as development of qualities necessary to function efficiently and maintain a healthy life style.

Health related physical fitness includes those aspects of physiological functions that offers protection of diseases resulting from a sedentary life style. It can be improved or maintained through a regular program of physical activity that adheres to the principles of exercise. The specific components of Health Related physical fitness include cardio vascular fitness, muscular strength and endurance, flexibility of lower back and body composition.

**Cardio vascular Endurance:**

The ability of heart and lungs to provide an adequate supply of oxygen to the body over an extended period of time.

The ability to exercise the entire body for extended period of time without undue fatigue. A strong heart is necessary to supply oxygenated blood to the muscles of the body effectively. (Hockey, 1973)

**Muscular strength:**

The ability of the muscles to produce force at high intensities over short intervals.
**Muscular Endurance**

The ability of the muscles to sustain repeated production of force at low to moderate intensities over an extended period of time. (Mathews)

**Flexibility**

The capacity of joint to move freely through a full range of motion. (Clarke, 1976)

**Body Composition**

The amount of lean body mass and adipose tissue found in human body.

It refers to the amount of body fat a person has. A fit person has relatively low percentage of body fat.

Body composition refers to the body's relative amount of fat and lean body tissue or fat free mass. Body weight can be subdivided simply into two components i.e. fat weight (the weight of fat tissue) and fat free weight (the weight of remaining lean tissue). The total percentage of fat of the total body weight represents body composition in terms of lean body mass and fat weight.

**Growth**

The term growth refers to the “increase” caused by biological process in which the organism becomes bigger in size, volume and heavier in weight.

**Development**

Development is a wider term indicating advancement, more unfoldment, a progressive change, a short of growing forward to greater maturity.
Somatotype

A quantification of three primary components determining the morphological structure of an individual, expressed as series of three numerals, the first referring to endomorphy, the second to mesomorphy and the third to ectomorphy. (Sheldon, 1954)

**Endomorphy:**

Endomorphy is characterized by roundness and softness of the body. Anteroposterior as well as lateral diameters tend towards equality in the head, neck, trunk and limbs. Features of this type are predominance of abdomen over thorax, high, square shoulders, and short neck. There is a smoothness of contours throughout, with no muscle relief. The breasts are always developed, usually as a result of fatty deposit.

**Mesomorphy:**

Mesomorphy is characterized by square body, with hard, rugged and prominent musculature. The bones are large and covered with thick muscle. Outstanding characteristics of this type are forearm thickness and heavy wrist, hand and fingers. The thorax is large and the waist is relatively slender. Shoulders are broad, the trunk is usually upright and the trapezium and deltoid muscles are quite massive.

**Ectomorphy:**

Ectomorphy includes as predominant characteristics, linearity, fragility and delicacy of the body. The bones are long and thin. The limbs are relatively long and the trunk short, however this does not necessarily mean that the individual is tall. The abdomen and the lumbar curve are flat, while the thoracic curve is relatively sharp and elevated.

For the purpose of this study, rating of endomorphy, mesomorphy and ectomorphy was done according to the somatotype method suggested by Heath and Carter.
Test

Barrow and McGee defined the test as “a specific tool, procedure or technique used to elicit a response from the subjects in order to gain information to be used as a basis for appraisal of quantity or quality of elements such as fitness, skill, knowledge and values.”

Norms

As per Barrows and McGee norms is “a scale that permits conversion from a raw score to a score capable of comparison and interpretation.”

Johnson and Nelson defined norms as “values considered being the representation of a specified population. Norms are usually based on age, grade, height, weight of various combination.

Significance of the study

The present study would contribute in the following ways -

1. The study would help in understanding the health related fitness levels among girls student between 5 to 15 years of age of Madhya Pradesh. This knowledge would serve as a guiding source for development of scientific and systematic physical education program for Madhya Pradesh school girls of this age group.

2. The study would also help to understand the growth patterns and the significant variations among girls of 5 to 15 years of age of Madhya Pradesh. This knowledge would further help parents, teachers and educational planners to plan physical education curriculum, nutritional requirement and academic curriculum for the school going girls of Madhya Pradesh.

3. The research study would also provide ready reckoner scale for the physical education teachers and coaches to evaluate the health related fitness of this age group of Madhya Pradesh on the basis of norms developed by the study.
4. The study would help the teacher of physical education and coaches to understand the morphological characteristics of girls of 5 to 15 years of age of Madhya Pradesh and variations if any during their period of growth and development. This would help in identifying talent of Madhya Pradesh girls in selecting players for different games and sports on the basis of trends available in cross sectional analysis.

5. The result of the study would also highlight the strength and weakness of the existing physical education programs in school education of Govt. of Madhya Pradesh.