CHAPTER-I: INTRODUCTION

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CHAPTER I

INTRODUCTION

1.1 GENERAL INTRODUCTION

Human beings have unlike shape and size at different places as because the need and demands are different for different places. They have developed according to their habitat and demand of their livelihood. The development of their body and body parts depends mostly on their daily activity. Adaptation helps them to acquire whatever is essential for them to survive. Darjeeling is a hilly area, narrow roads with ups and downs which require more stability that’s why the people residing there has low centre of gravity which is much required. The altitude wise anthropometric study on Darjeeling district particularly has not been conducted yet. This is the thrust area of research. This type of research is rarely conducted and the reason behind this is encroachment of physical education is very much rearward in Darjeeling as far as other districts of west Bengal is concerned. Physical education being the integral part of a total education process many schools of hills lack trained physical education teacher. Lack of single physical education college might be the supporting factor. In these days and age only a few physical educators has conducted their research studies in Darjeeling hills giving innovation to physical education and this work can be the major authentic document in the future as few projects have only been conducted on hills of Darjeeling so far. As we know that there are a lot of advantages of altitude as far as training and competition is concerned yet having all these advantages still, Darjeeling hill cannot produce a standard number of players in national and international scenario except few players in football and archery. Having shorter leg and greater stability hill cannot produce a single weight lifter, Gymnasts etc. are few reasons to push towards anthropometric research. As stipulated research has been done regarding altitude advantage but still to unfold hidden mystery was much needed.
1.2 HISTORICAL BACKGROUND AND IMPLICATIONS OF ANTHROPOMETRY

Anthropometric history is a term coined in 1989 by John Komlos to refer the study of the history of human height, focusing on explaining secular trends, cycles of various lengths and cross sectional patterns by changes in the socio-economic and epidemiological environment.

The systematic study of human physical stature reaches back into the 18th century (Tanner, 1981). By the 1830s, Adolphe Quetelet and Rene Villerme recognized that biological outcomes were influenced by both the natural and the socio-economic environment (Villerme, 1829, Quetelet, 1842). However, until French historians of the Annales School began to explore the socio-economic correlates of human height in the 1960s, the topic interested primarily scholars of sister disciplines such as anthropology, auxology, or even military history (Emmanuel Le Roy Ladurie, Bernageau, and Pasquet, 1969).

The true expansion of the use of anthropometrics in the social sciences began in the mid-1970s among cliometricians who were interested in measuring living standards in the past primarily in order to understand hidden effects of economic development on the growth of the human organism. Anthropometric history uses physical stature as an indicator of well-being to complement conventional indicators of living standards by the biological standard of living (Baten, 2000; Craig and Weiss, 1998; Cuff, 2005; Steckel, 1995; Sunder, 2004; Woitek, 2003).

Nevertheless, this is not to say that height itself has a direct benefit on economic success or an increased standard of living. Rod Usher's "A Tall Story For Our Time" shows that one's tallness is a product of favorable living conditions. Thus, growth in human height within a designated area could well be an accurate measurement of economic growth and development there.
Human physical stature is a useful supplementary indicator of well-being. Height and weight are components and a relatively easily measured indicator of biological welfare. In addition, we gain hitherto unknown insights of the effect of economic processes on the human organism. Hence, anthropometric history emphasizes that well-being encompasses more than the command over goods and services. Rather, it is multidimensional and height, weight, health in general and longevity all contribute to it—indipendently of purchasing power. In many ways, such indexes provide a more nuanced view of the impact of dynamic economic processes on the quality of life. Anthropometric indicators are not meant to be substitutes for, but complements of, conventional measures of living standards.

Various terms of anthropometry, dynamic anthropometry, sports anthropometry, physiological anthropometry, anthropomotorika etc. used by different scientist fall easily in the realm of kinanthropometry are in various scientific fields and it gets its strength from different disciplines. Anthropometry is thus useful tool in the hands of sports scientist, physical educationist, coaches, paediatricious, human biologist, anthropologist etc. The research workers in various such fields can pursue their research ideals of understanding and unearthing the mysteries of various dynamic processes and phenomena of life with the help of anthropometry. It helps to know the pattern of human growth and development with respect to age and surrounding environment. Anthropometry provides the standardized methods of measuring various body parts like height, body weight, transverse diameters of various parts of the body, circumference and length of various parts of the body and skin fold thickness etc. The body measurement can be used to study the gross size of an individual. It gives the idea about individual’s shape, size and proportion. The importance of proportion becomes evident when we compare the two overall different sized individuals. The proportions keep one measurement constant in all subjects compared and evaluate the differences in the other measurement. Physical and physiological maturity can be judged by body measurement. It can be used for monitoring the health and nutritional status of an individual.
Anthropometry is the measure of woman and man (anthro=man, pometry=measure). The study of anthropometry is the study of human body measurements to assist in understanding human physical variations and aid in anthropological classification. In many sports, success is often associated with a particular body configuration. For this reason, anthropometry can be used by coaches and trainers to help predict the activity at which an individual is most likely to succeed. Anthropometry is also used extensively to monitor health. The research workers in various fields can pursue their research ideals of understanding and unearthing the mysteries of various dynamic processes and phenomena of life with the help of anthropometry. Normally a person starts taking part in games and sports without proper guidance which leads a sheer chance that their choice of the sport may be suitable to their inherent capabilities. Therefore, the failure to become a champion in most of cases is inevitable. Thus there is an urgent need to provide counseling to those endowed with such suitable characteristics that form the basis of performance in the event. Like one boy who has strong calf muscle with short height can perform better in high jump at early ages but his short height will lead to failure in future so it is better to motivate him in the field of gymnastics than in the field of high jump. Carter (1970) considered that the morphological characteristics of athletes were of interest to the human biologist, for competitive sport demands the utmost from the body and it is, therefore reasonable to expect to find in athletes a demonstration of the relationship of structure and function. Parnell (1951) in an anthropometric study of athletes concluded that an individual’s choice of athletic events might be largely due to characteristics, probably inborn. Tanner (1964) examined the physique and body composition of Olympic track and field athletes and inferred that the athletes were both born and made. It is usually noticed that throwers at different competition are heavier and taller, with long muscular arms and wide shoulders because in throwing events, greater weight is useful, when the object is thrown forwards and upwards, an equal and opposite reactive force is exerted on the athlete, pushing him backward and down so the effect of this is less, if the athlete is heavier. Greater height in them will be of further advantage by making the flight of the implement longer before it lands the floor. Darjeeling is one of the districts of west Bengal which has got a height of
approximately 6000 ft. so we can aspect anthropometric variation in different altitudes.

### 1.3 PHYSICAL FITNESS AND ITS COMPONENT

Now let discuss something about physical fitness as it is a part of research. From early periods to present time physical fitness is the major subject of concern. Everyone should keep a particular fitness level to smoothly run their daily life. Physical fitness should be clearly defined before mentioning the motor performance to make the things clear. Physical fitness has been defined as a set of attributes or characteristics that people have or achieve that relates to the ability to perform physical activity. The above definition from Physical Activity and Health: A Report of the Surgeon General is the most common currently used definition of physical fitness. It was originally used by Caspersen and has been used extensively. An alternative definition by Howley and Frank that provides additional descriptive information is: Physical fitness is a state of well-being with low risk of premature health problems and energy to participate in a variety of physical activities. While either is a good definition, most experts agree that physical fitness is both multidimensional and hierarchical. According to Hardyal Singh, Fitness is a state which often characterizes the degree to which a person is able to function. Ability to function depends upon the physical, mental, emotional, social and spiritual components of fitness, all of which are related to total fitness. While fitness is the maximal, economical and efficient functioning of the body, health is referred to as optimal homeostatic functioning of the body.

In previous years, fitness was commonly defined as the capacity to carry out the day’s activities without undue fatigue. However, as automation increased leisure time, changes in lifestyles following the industrial revolution rendered this definition insufficient. Various features of 20th century civilization – television, spectator game, automobile, labour saving gadgets and urban overcrowding have conspired to create a generation of inactive children. This situation has no historical homologue and seems to contradict the very nature of any young mammal. It is an uncharted life style and may carry serious hazards for both the physical and intellectual development of
A growing child (Shephard, 1982). In current contexts, Physical fitness is considered a measure of the body’s ability to function efficiently and effectively in work and leisure activities, to be healthy, to resist hypokinetic diseases, and to meet emergency situations. American association of health physical education Recreation and dance adopted a new approach, physical fitness has now been dichotomized into two areas, and they are:

A. Health related fitness and

B. Motor fitness.

1.3.1 Health related fitness: The components of Health related fitness are the basis which measures our general wellbeing. It is the aim of exercise to improve our capabilities in each of these areas. Different sports will be more demanding in some, and less demanding in others, but athletes usually strive to achieve a reasonable level of health fitness in each area.

There are five health related components of fitness. These are Cardiovascular Endurance, Muscular Strength, Flexibility, Muscular Endurance and Body Composition. Unless athletes are focusing on perfecting their body performance for a particularly demanding sport, a balanced level of achievement in each of these fitness components should be the goal. Their fitness program should include activities and exercises that promote each of these health related fitness components.

1.3.2 Motor Fitness: It refers to the ability of an athlete to perform successfully at their sport. Motor Fitness refers to the capability of an athlete to perform effectively at their particular sport. The components of motor fitness are: agility, balance, coordination, power which entails speed and strength and finally reaction time. Motor performance can be assessed by conducting motor fitness components.
1.4 ALTITUDE GROWTH AND DEVELOPMENT

Prior to the 1968 Olympic Games in Mexico City (altitude of approximately 7300 feet), scientific studies of work performance at high altitudes had been concerned primarily with problems of military significance or of mountaineering expeditions. Now, however, there is a tremendous interest in the effects of altitude on athletic performance. In fact every large country and several of the smaller ones have undertaken investigation both at home and abroad to determine the specific effects of high altitude on sports performance. Several international symposia have been conducted to discuss problems related to work performance at high altitude.

Here as narrated in the title ‘altitude’ means height. As we go up the hills we have to accompanied with various changes such as decrease in total barometric pressure, decrease in partial pressure in oxygen, decrease in density of air, cooler and dryer air, climatic change like low temperature, nature of daily activity, haemoglobin quantity etc. From various studies it has become clear that altitude has a great effect on physical as well as anthropometric status of the population.

Human being is never static. From conception to death, change is constantly taking place in his physical and psychological capacities. The two words ‘growth’ and ‘development’ are often used to describe these constant changes. Ordinarily, the term growth is used in a limited way to refer to increase in size and weight, becoming larger and heavier. We speak of growth of muscles, growth of the brain and growth of the body in general. Growth can be viewed as physical changes that occur from conception to maturity. Term growth is generally used to indicate a growing that causes increase and enlargement. The heart grows and becomes bigger, the bones become longer, thicker and heavier. Meredith has defined physical growth as “the entire series of anatomic and physiological changes taking place between the beginning of the prenatal life and the death”

As we can predict that fat works as an insulator, the amount of fat might increase with increase of height as temperatures lowers with increasing altitude. It will be very
interesting if we get clues regarding anthropometric variation including pattern of growth, fat deposition etc. in respect of altitude from the study.

1.5 PRESENT SCENERIO OF FITNESS

In recent times, the field of sports has become popular, since youth in quite large members from developed, developing and under developed countries are participating in large numbers with a recreational and professional approach. The outcome of their quantitative participations is the resultant performance and vast improvement in the sports and games standard. The impact of knowledge of science on sports has raised the standard of sports manifold during the past century. Improvement in performance has taken place due to the application of the science at various levels, such as improvement in facilities, training methods, conditioning, nutrition, psychological intervention strategies and professionalization of sports itself. Man by nature, is highly competitive and in pursuit of performance he has always been striving to jump higher and farther, to run faster and to demonstrate greater strength and skill. We see many parents waiting their children outside the sports coaching centre which is a very positive sign as far as health and fitness of the society is concern.

But if we consider the dreary part of the present society, the amount of leisure time has increased in modern society time spent on sports has grown, while very few participate at the elite or Olympic level, there are many more who participate at the local or community level, for others involvement in sport is a passive one as spectators, coaches, umpires, teachers or sports writers. So, it is very important to think about these sedentary populations otherwise they will go through an unfit and diseased prone life.

1.6 STATEMENT OF THE PROBLEM

The present investigation was concerned with the comparative and correlative study on selected anthropometric and motor performance variables of 13-16 years old school going boys of four different altitudes of the Darjeeling district of West Bengal.
1.7 PURPOSE OF THE STUDY

The objectives of the present were as follows:

1. To observe the physique and physical characteristics of 13-16 years old school going boys of Darjeeling hills.
2. To examine the body composition characteristics of boys residing at four different altitudes.
3. To observe the motor ability of said groups of boys.
4. To analyze and compare the altitude wise differences if any, in selected anthropometric, body composition and motor performance variables among four different Groups i.e., 430 feet, 3000 feet, 6700 feet and 7200 feet respectively.
5. To study the relationship between motor performance variables (dependent) with anthropometric variables (independent).

1.8 SIGNIFICANCE OF THE STUDY

1. As we generally observed that the hill people have comparatively short lower body and stability seems to be major reason behind short lower portion required by hill people as far as their daily activity is concerned. So study will help us to understand whether difference is according to altitude or not.

2. It also explores the difference between body compositions with references to changing altitude. And this study may throw new light on selection of specific sports on the basis of physique and body dimension regarding the living altitude of the adolescent male.

3. It will help to know about the length ratio of upper and lower body height.

4. The study will give an idea about the fat percentage of the hill adolescence.

5. The study will reveal the fact about the B.M.I of hilly adolescence living at different altitude.
6. The study will help the physical educators and coaches to select their teams on the basis of body proportion and body composition.

7. Study will also help to form teams on the basis of geographical condition and altitude.

8. It will help to formulate body fat percentage norms of Darjeeling hilly adolescence.

9. It will help the secondary education board to prepare physical education program according to the need of hilly school students.

10. It will provide the clear picture of physical status of Darjeeling hill adolescence.

11. It will help to know the health status of hill adolescence and to structure the proper fitness program.

12. The study will help to know the difference in physical fitness according to altitude.

1.9 DELIMITATION OF THE STUDY

1. The subjects of the study were the inhabitants of four different altitude of Darjeeling district of west Bengal, India. Therefore subjects of the study were delimited to four different altitude of Darjeeling district, west Bengal, India.

2. The age range of the subjects were delimited between 13-16 years only and were sub divided in four different age groups i.e., 13 years, 14 years, 15 years, 16 years.

3. The subjects of the present study were further delimited to boys only who were studying in different schools located at four different altitude of Darjeeling district of West Bengal.

4. The study was restricted to selected absolute and relative anthropometric variables such as linear measurements (Weight, Height, Sitting Height, Foot Length, Acromiale-Radiale, Radiale-Stylion Radiale,
Midsty lion-Dactylion, Trochanterion-Tibiale Laterale, Tibiale Mediale-Sphyrion Tibiale, Tibiale Laterale Height); bone diameters (Biacromial, Biiliocristal, Biepicondylar Humerus, Biepicondylar Femur); circumferences (Head, Neck, Arm Relax, Flex Arm, Forearm, Wrist, Waist, Gluteal, Calf, Ankle) and skinfold thickness (Triceps, Biceps, Subscapular, Iliac creast, Supra spinale, Abdominal, Medial calf).

5. The study was further confined to four selected motor performance variables including speed, explosive strength of the leg, strength endurance of the abdominal muscle and agility of the subject.

1.10 LIMITATION OF THE STUDY

1. The subjects of the present study were the school going boys of four different altitude of Darjeeling district. Though racial and ethnic were somewhat same but climatic and environmental conditions differ from each other. As the lowest altitude school is situated at plain region and highest altitude school is situated on the hilly region of West Bengal. The data collection was limited to Darjeeling district only.

2. Due to lack of time and availability of the school, permission from school authority, location of the school investigator could not maintain the sequence of altitude.

3. It was very difficult to get many govt. aided school at the same location and same altitude and it was not approving to take students from private schools as they differ in socio economic status. That’s why the subjects were restricted to sensible number.

4. Though the test and measurement was conducted in the same month, environmental condition and climate differ at different altitude and the haemoglobin level will obviously increase at high altitude may affect the physical performance which was beyond the control level of the researcher.

5. The dietary habit and daily activity and other activities of the subject were beyond the control of the researcher.
6. The psychological and physiological profiles of the subjects have not been measured but there was no abnormalities observed and presumed that it was more or less same.

1.11 HYPOTHESIS OF THE STUDY

1. Due to variation in the altitude, the daily activity of walking ups and downs in the hilly region and stability required causing lower center of gravity, it is hypothesized that there will be wide variation in the linear measurements among the four different altitude male adolescents.

2. Breadth measurements are hypothesized to vary among four different male students.

3. Circumference or girth measurements are hypothesized to differ among four different male students.

4. Body composition variables of four different altitude male adolescent are hypothesized to differ from each other as the daily routine of an individual and the transport facilities are not sufficient at hilly region compared to plain or low altitude regions that’s why hilly or high altitude male school students walks averagely more than low altitude to reach their respective schools.

5. Motor performances are to some extent related to physique and body composition so it was expected that four groups in respect of motor performance will differ from each other.

1.12 DEFINITION OF THE TERMS

**Physique:** Physique denotes the size, composition and structure of an individual (Boileau and Lohman, 1977)

**Anthropometry:** The measurement of structure and proportion of the body is called anthropometry (Phillips and Hornak, 1979)
**Agility:** Agility refers to the maneuverability of the body or body parts. It involves the ability to change rapidly the position and direction of the body and body parts (Verducci, 1980).

Explosive strength: Explosive strength is the ability of a muscle or a group of muscle to release maximum force in the shortest possible time, in an explosive manner, projecting towards an object (Clerke, 1976). It is the ability to exert maximum energy in one explosive act (Fleishman, 1964).

**Speed:** The result of applying forces to a mass and usually implies movement at a constant rate (de Vries, 1971).

**Anthropometric measurement:** Anthropometric measurements are dimensions of the structure of the human body taken at specific sites to give measures to length, girth, mass and percentage of subcutaneous fatty tissue (Clarke, 1976).

**Motor ability:** A readiness or preparedness for performance with special regard for big muscle activity without undue fatigue.

**Physical fitness:** Physical fitness is considered a measure of the body’s ability to function efficiently and effectively in work and leisure activities, to be healthy, to resist hypokinetic diseases, and to meet emergency situations. That state which characterizes the degree to which the person is able to function. Fitness is an individual matter. It implies the ability of each person to live most effectively with his potentials. Ability to functions depends upon the physical, mental, emotional, social and spiritual components of fitness, all of which are related to each other and mutually interdependent (A.A.H.P.E.R).

**F-value:**

Mean square variance between-groups/Mean square variance with groups.