CHAPTER-I

INTRODUCTION

To attain physical structure of an individual, growth and development are necessary right from the mother's womb. In growth and development the emphasis is from an immature subject to a matured subject. Growth has been defined by some eminent scholars in their own valuable ways. The term growth and development as used in physical studies refer to the processes common to all living organisms, processes intimately linked in time but partially independent, unquestionably genetically determined yet uniquely susceptible to environmental modifications (Garn, 1952), these terms are generally used synonymously but in the biological sense, they are not the same (Das, 2003).

Bogin (1999) defined growth as a quantitative increase, in size or mass. Measurements of height in centimeters or weight in kilograms indicate how much growth has taken place in a child. Additionally, the growth of a body organ, such as the liver or the brain, may also be described by measuring the number, weight or size of cells present. Development is defined as a progression of changes either quantitative or qualitative that lead from an undifferentiated or immature state to a highly organized, specialized and mature state. Watson and Lowrey (1962) stated that both growth and development in a normal child parallel each other and any separation would be an artificial one. They restrict the term growth to mean an increase in physical size of the whole body or any of its parts, which can be measured in terms of inches or centimeters and pounds or kilograms. Development, on the other hand, indicates an increase in skill and complexity of function.

Richards and Kavanagh (1945) write, "Growth is a fundamental attribute of living organism, manifested by a change in size of the individual or in the number of organism in a unit of environment". Growth has been described as a "mirror of conditions of society" and height as a "proxy for health", even in the apparently favourable conditions of the so-called developed nation, growth is curtailed in some sections of population by deprivation, illness, psychosocial stress and family size (Morgan, 2002). Therefore growth refers to a positive change in size of a growing

individual, a dynamic measure of health, the best available indicator of nutritional status and the only real measure of nutrition adequacy (Rohde, 1985).

Growth is not in the steady process of increment in which all parts of the body increase at the same rate, some parts of the body may increase rapidly for a period while others may not. Tanner (1962) says, "Human growth is not a steady and a uniform process of acceleration in which all parts of the body increase at the same rate and the increment of one year may be equal to the proceeding and succeeding year". Thus on the basis of the types and rates of growth, a pattern may be obtained. The pattern of growth existed at a rate affected by heredity, nutrition, climate and the interaction of all of these.

There are many factors that affected growth and development which are influenced by the genetic and environmental conditions. Some of them are hereditary in origin and others are restricted to dietary habits, culture, psychological stress, seasons, etc. Socio-economic status reflects a complicated mixture of hereditary and environmental influences and probably acts through out the whole period of growth. Growth depending on hereditary factors is indicated by the differences found in the amount and/or rate of growth between children and adults of different national or geographic backgrounds living in the same or very similar environments. The genetic control of body shape is much more rigorous than that of size (Tanner, 1978).

Bogin (1999), has divided the environmental factors into five categories: i) nutrition, ii) altitude, iii) climate, iv) migration and urbanisation and v) socio-economic status.

Nutritional status is one of the indicators of the overall well being of population and human resource development. It refers to the health of an individual as it is affected by the intake and utilization of nutrients. Nutritional health can be described at several levels. Normal nutrition implies a sufficiency of nutrients and energy intake, neither deficiency nor excess, that affords the highest level of well-being (Sharma & Dwivedi, 2005).

According to Brown (1984) nutritional status is the physical expression of the relationship between an individual's dietary intakes, the bioavailability of the ingested nutrients and his or her physiological requirements. Nutrition influences both growth and development during pre-natal as well as post-natal phases (Das, 2003), as it

encompasses total energy intake and intake of energy yielding macronutrients. Growth is a sensitive indictor of nutritional status in children and adolescents. The pattern of growth over a time period and the child's progress along a consistent channel are the best measures of whether the diet is supplying sufficient nutrients for growth, energy and physiological needs without the excess which may lead to obesity (Jaswal et. al., 2005) Nutrition is the single most important determinant among the environmental factors as nutritional assessment is to map out the magnitude and geographic distribution of malnutrition as a public health problem, to discover and analyze the ecological factors that are directly or indirectly responsible and guiding action intended to improve nutrition and health (Jelliffe, 1966).

To Begum (1991), human nutrition is governed by many factors, like food habits and behavior, beliefs related to food, ethnic influences, geographic influences, religious and sociological factors, psychological factors-production, income, national and international food policies, food technology, transportation, marketing, educational status, and mass media facilities. The major cause of undernutrition in developing countries is the poor socio-economic condition (Martorell and Ho, 1984). Assessment of nutritional status of children is useful not only for understanding the health status of a community, but also for national and/or regional policy planning (Khongsdier, 1995).

According to Eveleth and Tanner (1990), "A child's growth rate reflects, perhaps better than any other single index, his state of health and nutrition, and often indeed his psychological situation also. Similarly, the average values of children's height and weight reflect accurately the state of a nation's public health and the average nutritional status of its citizens, when appropriate allowance is made for differences, if any, in genetic potential. This is especially so in developing and disintegrating countries". Therefore, many studies on growth have been carried out in different-parts of the world with a view to understanding the socio-economic and the health/nutritional status of different populations including those in India (Sharma, 1992).

The quality of nutritive intake influences the growth and development of the organism, as well as the nutritive and health status. Therefore, it is important that nutrition is adequately adjusted to the needs of the organism. Children and adolescent populations are very sensitive to inadequate nutrition. Teenagers make many more

choices for themselves than they did as children. At the same time, social pressure thrusts choice at them (Glanz, et. al., 1998). The consequences of these choices will influence their nutritional health both today and throughout life (WHO, 1998).

The socioeconomic status is a term describing a complex phenomenon predicted by a broad spectrum of variables. It is often conceptualized as a combination of financial, educational and occupational influences (Black and Krishnakumar, 1999). These influences are usually interrelated; it has been proposed that each reflect somewhat different forces affecting nutrition, health and disease. However, the education level of the parents for example, could be recalled and recorded, in the field with higher degree of accuracy than other variables. It indicates as well, skills and concepts that could provoke acquisition of positive social, psychological and economic resources (Winkleby, 1992).

The effect of socio-economic status on growth and development has a secondary influence, interacting with nutrition, altitude, climate or migration. However, socio-economic status has an equally important impact on growth (Choudhury et. al., 2003). Bielicki and Welson (1982) listed four primary factors: higher socio-economic status allows for better nutrition, better health care, reduced physical labour for children and greater growth promoting psychological stimulating from parents, schools and peers. The influence of education, occupation, income and housing on growth has become evident as well as the specific effect of each measure of socio-economic status; it is possible to fractionate the influence of education, income and occupation on both growth and size (Garn et. al., 1978).

Puberty is a special period with an obvious growth spurt which varies, among populations, in amount, age of take off, duration and age at peak height velocity, depending on numerous factors of which the socioeconomic environment is significant (Tanner, et. al., 1966; Matsumotu, 1980). Optimal feeding practice, provision of enough good building material and proper health care measures are essential for all the ongoing and future biological processes. Commonly, poor hygienic conditions, high frequency of infections, poor family nutrition, short birth intervals and inadequate prenatal care are more often confined to low socioeconomic strata and to rural areas; particularly in developing countries (Garnett and Cowell, 1999).

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The whole process of growth has been taken place in two stages, prenatal stage (before birth) and postnatal stage (after birth). The growth and development are the continuous processes from prenatal to the postnatal stage, but the incident of birth is an important dividing point. Birth is the earliest stage at which growth can usually be examined. Life after birth has been divided into different periods of growth by various authors. Each periods having one or more characteristics relative to growth that set it apart from others, the different periods are the neonate, infancy, early childhood (pre-school), late childhood (pre-pubertal), adolescence, adulthood and senescence.

Basically there are two methods for studying growth: cross-sectional and longitudinal. In a cross-sectional study each child is measured once only, where as in a longitudinal, each child is measured at each age for a long period of time. In this regard, some children leave the study and others if desired join it, this kind of study is known as mixed-longitudinal method. Both cross-sectional and longitudinal studies have their uses, but they do not give the same information and can not be handled in the same way.

Three types of measurements may be considered during the study of growth: linear, areal and ponderal. Linear measurement is usually evaluated in terms of increase in length or height of the body as a whole (stature) or of the body stem (sitting height) and areal measurement is for determination of surface area (circumferences) at various ages in the development of periods where as ponderal measurement is for evaluating the increase in body weight or mass of the body.

There are two types of growth curve for studying growth, namely distance curve and velocity curve. Growth may be considered as a form of motion, an object may move from one point to another covering a distance. This distance can be measured. Similarly, a part of the body grows from one age to the next. This increment can be measured and can be shown in a curve. This type of curve is called distance curve. Again during movement the object may not move at the same speed all through. In the same manner, the velocity or rate of growth may not be the same during different stages of growth. This can be obtained from velocity curve.

As there is growth from prenatal till the post natal stage of an individual, adolescent is also one of the post-natal stages where an individual is showing a remarkable increase in growth. This is known as adolescent growth spurt. Adolescence

is not the same in all the populations, since it might be affected by the different factors of heredity and environment. In adolescence period every muscular and skeletal dimension of the body seems to take part, the reproductive organs in particular. It is the general term used to describe the psychological changes occurring in the passage from childhood to adulthood. In adolescence unique changes occur and many adult patterns are established during this period. In addition the proximity of adolescence to biological maturity and adulthood may provide final opportunities for preventing adult health problems. Adolescence begins with pubescence, the earliest signs of development of secondary sexual characteristics and continues until morphologic and physiologic changes approximate adult status, usually near the end of the second decade of life.

Adolescence, a period of transition between childhood and adulthood and the health of adolescents attracted global attention in the past two decades. Poor nutritional status during adolescence is an important determinant of health outcomes. Short stature of adolescents resulting from chronic undernutrition is associated with reduced lean body mass and deficiencies in muscular strength and working capacity. In adolescent girls, short stature that persists into adulthood is associated with increase risk of adverse reproductive outcomes. Overweight and obesity during adolescent period are associated with risk factors for obesity-related diseases in adulthood. As health systems have accepted life-cycle approach, the proximity to biological maturity and adulthood may provide final opportunities to implement certain activities designed to prevent adult health problems. Though the health issues of adolescents like sexually transmitted disease and reproductive health have been given due importance, limited research work has been done on their nutritional status (Deshmukh, et al., 2006).

Medhi et. al., 2006, wrote adolescence is characterised by an exceptional rapid rate of growth which exceeds only during fetal life and early infancy. Due to rapid accretion of new tissue and other widespread developmental changes, nutritional needs are also more during this period of life cycle. However, inadequate diet and unfavourable environment in developing countries may adversely influence the growth and nutrition of adolescents. Poor nutrition among adolescents resulting in short stature and low lean body mass is associated with many concurrent and future adverse health outcomes including poor reproductive output among women. The proximity of

adolescence to biological maturity and adulthood may provide final opportunities to implement certain activities designed to prevent adult health problems. This period is also known to be second opportunity of growth as it facilitates catch-up growth for children experiencing nutritional deficits during early life. While adolescence is clearly an important period of human development, it has often failed to receive the attention given to earlier periods in childhood with regards to health related uses and interpretation of anthropometry.

A child's genetic make-up gives him the potential to develop specific characteristics in a predetermined sequence. But this becomes possible only if his environment is compatible with each part of the development process at the appropriate time. It may be pointed out that an environment which is satisfactory at one stage of development may be unsuitable at another, and thus may modify or prevent the realization of some part(s) of the genetic plan. The final size and shape attained by the growing child by continuous interaction both genetic and environment forces. However this interaction is not a simple additive process. The response of a child to any change in external circumstances depends not only upon his genotype but also upon the complexities of the environment in which he is growing (Shukla and Rastogi, 2002).

Growth and development during the post natal period is also affected by the interaction of genetic and environmental factors. However environmental influences become more important after birth because the child is more exposed to such factors. As the infant grows up it adapts to an increasingly complex environment. It is well known that the measurements of the body e.g., stature are largely influenced by that of the parents. The rate and pattern of children's growth also varies between the different ethnic groups which lead to difference of adult physique. Adult physique is clearly the result of continuous interaction of heredity and environment (Shukla and Rastogi, 2002).

A majority of malnourished children fail to achieve their full genetic potential of body growth (both linear and ponderal) and are thus stunted or wasted or both. Studies on growth and development of children provide important information on the nutritional status of the community. Therefore, regular monitoring of child growth is very important particularly for a vast multi ethnic and multi cultural country like India where

growth and nutritional status of children vary from region to region and state to state (Shukla and Rastogi, 2002).

Adolescence is a transitional phase in life when one experiences growth and maturation. Nutritional status during adolescence and youth are determinants of many of the health outcomes in later life. Undernutrition continues to be a major problem in India especially among rural population. Though the health issues like reproductive health including sexually transmitted diseases have been given due importance, limited research work was done on the nutritional status of adolescents and youth. From National Family Health Survey, 2005-2006, it was evident that almost 46 percent Indian women in the 15-19 age groups had BMI of less than 18.5 kg/m2. Therefore, nutritional status has to be considered in present scenario which would help in achieving the goals of reproductive health such as reduction in proportion of low-birth weight babies, improving pregnancy outcomes, and reducing maternal deaths. Other than the nutritional status, the illness episodes are often experienced by young people especially in rural India where personal hygiene is poor, availability of safe drinking water and toilet facility is lacking.

Physical growth and development historically has been and remains an important subject for physical anthropologists to investigate and understand the totality of human beings, which is the enterprise of anthropology (Choudhury and Begum, 2003). Understanding the evolution of the variety of growth patterns seen in the world's populations will also be valuable in explaining the issue of work capacity and strength. Physical growth and development are the most important and basic characteristics of living organism. They also indicate in quite objective terms, the social and the cultural development of a society.

Growth assessment is the single most useful tool for defining health and nutritional status in children at both individual and population levels. This is because disturbances in health and nutrition, regardless of their etiology, almost always affect growth. Proper growth monitoring consists of serial assessments of both weight and height measurements over time so that growth velocity can be assessed. In some situations, a single set of measurements may be used for screening populations or individuals to identify abnormal nutritional status and priority for treatment. Growth

monitoring strives to improve nutrition, reduce the risk of inadequate nutrition, educate caregivers, and produce early detection and referral for conditions manifested by growth disorders. At the population health level, cross-sectional surveys of anthropometric data help to define health and nutritional status for purposes of programme planning, implementation and evaluation. In all settings, growth monitoring is also used to assess response to intervention.

The study of growth and its related problems is one of the important aspects of physical anthropology. They prepare growth curves, growth standards and find out the reasons for normal and retarded growth. Their findings are fruitfully utilized to build a healthy nation. The children are the future of a nation. Their good health is national wealth. So every possible care should be taken so that the children become healthy. There should be normal growth and development of the children (Sharma, 2005).

There are many reports on the growth study among different populations in the Northeast India, but these studies are few in numbers and comparatively limited in purposes (Khongsdier, 1999). Most of the growth studies were carried out in order to understand the population variation in the growth patterns of children (Khongsdier and Ghosh, 1998) and very few growth studies have been carried out with a view to assessing the health and nutritional status of a population, especially in the state of Meghalaya (Mukherjee, 2002). The National Family Health Survey (NFHS, 1998-99) has revealed that Assam and Meghalaya are the two states with highest prevalence of undernutrition in North-East India. Such a high prevalence of undernutrition as indicated by anthropometric measurements and indices was also observed in the urban areas of Meghalaya (Mukherjee, 2002). Therefore the prevalence of undernutrition will be higher in rural areas and with this, it is important to conduct a growth study with a view of assessing the nutritional status of adolescents and to find out the factors responsible for the growth failure and high prevalence of undernutrition.

Therefore an attempt has been made to carry a cross-sectional study on "Growth and Nutritional Status" among the Pnars residing in the Laskein community development block of Jaintia Hills, Meghalaya taking into consideration the following objectives:

Objective of the study

1. To study the growth pattern of Pnar children aged 8 to 18 years in terms of anthropometric variables,

2. To assess the nutritional status of these children, using certain anthropometric indices relative to the recommended growth reference,

3. To find out the incidence of nutritional deficiency signs if any, and

4. To link the effects of socioeconomic factors such as occupation and education of mothers, household income and family size on physical growth and nutritional status.