CHAPTER - I
INTRODUCTION

Growth is a fundamental and common property of life. It is a complex phenomenon and its course is governed by certain fundamental laws. Growth as we know is an increase in number and the physical size of cells. It can be defined as a net increase in size or mass. Garn (1952) defined it as a change in magnitude, increment in the size of the organs, increase in the thickness of tissue or change in the size of an individual as a whole. Macy and Kelly (1957) referred to it as the biochemical metabolic relationship between the physical and chemical composition of the body.

Knowledge of human growth has been best utilized to bear upon the state of health and nutrition in a population (Jelliffe, 1966) and such knowledge is of great practical value in various fields connected with public health, social pediatrics and epidemiology (Tanner, 1981, Robinow, 1982). In these fields state of nutrition and health may be regularly evaluated through different monitoring and surveillance programmes for the very interest of human welfare (Rona and Chinn, 1984; Jordan et al., 1975; Roede and Wieringen, 1985; Pro做到, 1970; Eiben, 1982 and Wolanski and Lasota, 1964). Additionally, in assessing the clinical condition of a child, knowledge of growth velocity may be judiciously applied to have a proper assessment (Marshall, 1977).
Growth may therefore be understood as a natural biological process causing certain patterns of increase or decrease (changes), in physical, anatomical and physiological characters which are used to describe different dimensions of human body. The study of somatic or physical growth attempts to describe or measure sequences of morphologic changes at successive ages within a certain environmental condition under which an individual grows up from infancy to adult stage (Johnston, 1978).

Comprehensive studies of growth based on standard techniques were conducted by Shuttleworth (1938), Simmons (1944) and Garn (1957). The monographic studies of Espensehade (1940), Shuttleworth (1939) and of Hagen (1966) describe the physical growth of girls and boys in relation to several factors which are supposed to influence the process of growth.

The extensive researches of Tanner (1962), Falkner (1962), Damon (1965) and many others have already proved beyond doubt that body growth in man is the result of an interaction of environmental and genetical factors.

A large number of authors have studied growth during adolescence of different body dimensions of man in different populations.
over a long period of time by using cross-sectional, mixed longitudinal and longitudinal methods.

The most important biological event in the period of postnatal growth is referred universally as adolescent growth spurt (Tanner, 1962; Tanner et al., 1976; Malina, 1978; Hauspie, 1980). This is the biological phenomenon that depicts sudden marked acceleration and velocity resulting a change in overall body size and its components (Tanner et al., 1976), shape (Hiernaux, 1968) and composition (Forbes, 1978) as well as structure and function in the reproductive organs (Marshall, 1978). Among the boys this period is also characterized by an increase in performance, muscular power and endurance (Bailey et al., 1978). A significant correlation between physical skeletal and sexual growth during adolescence have been observed (Bielicki et al., 1984). Sex differentiation for the adult physique starts from the stage of adolescence (Tanner, 1962, 1978). However, there is a wide range of individual and sexual variation in timing, intensity, magnitude and duration of adolescent spurt in different bodies.

Weiss et al. (1949) do not consider "growth" as a scientific term with defined and constant meaning but a popular label that varies with the accidental traditions, predilections, and purposes of the individual or school using it.
According to Tanner (1962) "Growth is a complex phenomenon and is the product of one's genetic potential and environmental factor, acting upon it."

According to Jelliffe (1966) Growth is influenced by biological determinants including sex, intrauterine environment, birth orders, birth weight in single and multiple pregnancies, parental size and genetic constitution and also by environmental factors.

"The study of growth is very important from the viewpoint of evolution, because any changes brought about in the morphological or physiological features of an organism during the course of evolution are controlled by genetically determined pattern of growth and development. The study of growth is important also to understand differences among the individuals relating to form and function in man for many of these also arise through differential rates of growth of particular parts of the body relative to others" (Tanner, 1977). Growth study, thus, helps inter-alia (a) to systematize the sequence of age specific morphologic changes, (b) to highlight the factors which have modifying influences on physical growth and (c) to build up standards of growth and to contribute proper understanding of the favourable environment including socio-economic condition conducive to desirable healthy human growth (Meredith, 1959).
There is a related term, development, which is defined as functional maturation (Watson and Lowenberg, 1967) and the progressive changes that occur during organisms life history (Handler, 1973). It implies differentiation of tissues, changes in complexity and changes in proportions. Development can sometimes take place without changes in magnitude. It may also result from a constant difference in growth rates, so that one tissue or organ increase faster than the other (Garn, 1952). Growth and development are processes common to all living organisms' processes intimately linked in time but practically independent (Garn, 1952). In this sense growth forms part of the development of the organs in the earlier stages of life, since growth tends to virtually ease for most of the organs after some age, once maturity is reached but development may continue. The limits of growth are set by hereditary potentials, environmental modifications especially through nutrition and toxicity, surface volume ratio and structural limitations, according to engineering principles (Thomson, 1970; Garn, 1952; Tanner, 1977). The remaining aspects of development are physical changes, which are most marked during adolescence.

The origin of the word "adolescence" is from a Latin Word, "adolescens" which means "to grow to maturity."
Adolescence is the process of development from childhood to adulthood, it is that final chapter in the growth story in which the boy becomes a man and the Girl a Woman. It is at this time that the human being is physically completed, its period beginning with the appearance of secondary sex characteristics and terminating with the cessation of somatic growth. It is the increasingly lengthening period between puberty and adult independence (W.H.O. 1972). Comas and Faulhaber (1965, 1960) describes adolescence as the last great evolutive crisis of growth, an important transitional period of childhood to adulthood and a stage whereing sexual and morphological character, which define the future adult biotype are set.

Adolescence has a special significance in the study of human growth since extra uterine growth in terms of velocity accelerates only during the first half of the adolescent period (Heald et. al., 1969). This is the period of maximal increment and development (Physical change) of the body. It is during adolescence that most adult differences in morphology, composition and performance have to their genesis (Malina 1974). Further more, adolescence is relatively a new phase of growth wherein hormones from the gonads and the adrenal combine with growth hormone to produce the adolescent spurt (Tanner, 1977).
The effect of social condition and nutrition on growth has been worked out by Baldwin (1920), Steggerda (1928), Connolly (1928), Todd (1930), Meredith (1962) and several other workers.

Before 1930, very few attempts had been made to compile growth data with an adequate size of samples. A few of the reputed work on Indian populations are Roy Chowdhury (1933), Mahalanobis et. al. (1949), Manson and Benedict (1931), Krishnan and Vareed (1932, 1933) and Mason (1932).

Similar studies were later conducted by Agarwal et. al. (1974), Ajyar and Agarwal (1969), Bansal (1968), Basu (1962), Behara et. al. (1982), Bhandari et. al. (1975), Chaudhuri (1978), Ghai (1979), Lal (1972), Sidhu (1974), Singal (1979) and Singh (1976).

The interests in the study of growth among Indian girls developed around 1966. The author also studied the relation of weight to stature in Indian women (Clarke 1966). Randhawa (1974) studied the age change as seen in the physical growth of Brahmin and Thakur girls of Madhya Pradesh Bali and Randhawa (1979) investigated body girth relationship with menarche.

The present text is arranged in two parts. Part I is concerned with an Introduction, of Material and Method; Nutrition, Health and Physique; Physical growth and growth rhythm and Relative growth and Growth variability is treated in chapter 5 of part one.

In order to deal adequately with this problem, it was felt necessary to select the subjects rather carefully, and unrelated individuals as felt appropriate for this kind of study.

The strength of the total sample is 550 individuals. Each individual is represented by developmental and anthropometric measurements.

The individual drawn for this study where exclusively from Jabalpur City.

The second part of the present work deals with the study of onset of menarche among 143 girls. Ranging between age group 11 to 16 years.

The relationship of above samples has further been investigated for secondary sexual development with special reference to Nutrition, Environment and Anthropometric measurements.
REFERENCES


