CHAPTER I

INTRODUCTION
Review of the literature

Growth of a living organism is a natural phenomenon. Every living organism necessarily undergoes the process of growth in association with development. Growth and development occupy a central place in the study of individual differences in structure and function within the human species (Tanner, 1960). The importance of growth studies in national life can never be over emphasized. It is one of the important means by which the progress of the country in the field of health and hygiene can be evaluated from time to time. The study of growth in man throws light upon the fundamental biological problems relating to 'inter-individual' and 'intra-individual' differences in physical development. In India, the importance of studies in human growth has been recently oriented.

We know that every individual grows from the time of conception to adulthood but why we grow is still a mystery. Garn and Samir (1958) say that growth in general is not well understood, though it is easy to measure and simple to demonstrate, why they grow is still a fundamental mystery.

Different scientists have defined the term 'Growth' in different ways. Growth refers mainly to change in magnitude, increments in the size of organs, increase in the thickness of tissue or changes in the size of individual as a whole or growth is the summation of those co-ordinated biological and chemical processes that are initiated with the fertilisation of the ovum and are terminated with the attainment of the body size and
conformation and of the physiological capabilities characteristic of the species and of the heredity background of the individual (Mitchell, 1962). According to Thompson (1959) the term growth implies the concept of magnitude and direction, it also involves the dimension of time. According to Weiss (1939) it is not a scientific term but includes reproduction, increase in weight, gain in organic mass, cell multiplication, mitosis, cell migration, protein synthesis etc. Washburn (1950) says that changing structure and function in a child are inseparable. According to Comas (1960) growth is the objective manifestation of hypertrophy and hyperplasia of the organism's constituent tissue and is determined by postnatal body size. The increase is limited by pre-established constitutional heredity factors and influenced by exogenous factors. Stuart (1959) stated that growth refers to the changes in size, resulting from multiplication of cells on increase in intercellular substances. Banik and Westland (1962) emphasized that in studying the complex process of human growth, we must accept the fundamental hypothesis that an individual child represents an indivisible biological unit. According to Falkner (1962) the whole process of growth is extremely complex and consists of numerous processes interacting with each other. It would, therefore, follow that growth refers to all the changes that occur in the body mass of an organism and its tissue component dimensions with advance in age (Barn, 1952; Comas, 1960; Watson and Lowry, 1961). Schults (1956) stated the phenomenon of human
growth with a view to understand constantly changing ontogenetic conditions and their highly varying tempos at various periods of life. Tanner (1962) stated that growth status of a child at a particular age is the result of interaction of both genetical and environmental factors and the possibility exists of certain environment being favourable for a child with certain set of genes and highly unfavourable for another.

A new concept of Chemical Anthropology by Macy and Kelly (1957) further extends the study of growth. Here the approach suggested is, biochemical metabolic relationship between physical growth and chemical composition of the body.

The earliest records concerning the anatomic differences of the child and the adult, with some references to developmental anatomy, was by Gabrielo de Zerbis in 1502 (cf. Scammon, 1927). Although the interest in the study of the nature, growth and development of the children goes back to the works of Juan Luis Vives (1497 - 1540), Jan Amos Komensky (1592 - 1670) and Jean Jacques Rousseau (1712 - 1778) as is reported by Comas (1960). The orientation of the science from the beginning was more psychologic than physio-somatic or morphological. Francois Mauriceau was the first to give accurate descriptions and illustrations of the proportions of the fetus and newborn (cf. Cone, 1961). For the first time in 1786 Joseph Clarke reported correct figures for weight and normal head circumference at birth (cf. Lowry, 1978). The oldest longitudinal studies of the growth of a child was carried
out by Count Philibert Gueneau de Montbeillard, which was completed in 1111 but was published by his friend, Buffon, in 1837 (cf. Scammon, 1927). Certainly the first complete study on physical growth of children was carried out by Lambert Adolphe Jacques Quetelet (1796-1874), a Belgium astronomer and statistician in 1835. The term 'anthropometry' was also originated by Quetelet. Tanner (1959, 1977) reported that Roberts and Bowditch made their contribution at the same time. Early studies on growth showed that from birth onwards the rate of the absolute body dimension decreases until adolescence when the rate of growth rapidly increases which remains for a few years. A great and fundamental discovery in human growth is made by Boas (1897, 1930, 1937, 1933, 1935 and 1940) - a discovery summed up in his own phrase 'tempo of growth'. No account of the history of growth studies could ignore the author of 'Growth and Form' in placing D'Arcy Thompson (1860-1948) next to Boas. As a final note on the historical review on growth, Tanner (1977) states 'with Boas and D'Arcy Thompson we come to the present day. The scientific study of human growth began with Buffon and Montbeillard, its social application with Quetelet, Cowell, and Horner. Roberts, the factory doctor, Bowditch and Townsend the physiologists; and Kotelmann and the other school physicians established growth firmly in science and medicine Boas and D'Arcy Thompson complete the development. The one taking us squarely into the modern context,
the other reminding us that the roots of knowledge and understanding are nourished through soil deposited in the past."


Studies of growth and development help to illuminate problems in body build and physique as well as problems in race while it has been shown that quantitative and qualitative changes in diet do affect body form and size. Pattern of physical growth is related to many genetic and environmental factors. Rate of growth is variable in different populations and sexes. Causes of constitutional differences and pathological
differences can be ascertained by somatometric studies. There is no guarantee, however, that all populations have the same growth potential. There are certainly large differences between populations, in height and weight and the age of puberty for example, and it is not clear how much of them is due to heredity and how much to environment (Tanner and Eveleth, 1976). Growth studies on different populations of the world shows that children of high socio-economic group are taller and heavier than children of the same age of low socio-economic group. Tanner stated that the pattern of growth is not only governed by genetic factors but paratypic factors like nutrition and environment too. Nutrition factors and endocrine secretions also affect the growth process of a child at the time they are operating (Tanner, 1962, 1966). Montagu (1960) pointed out "no studies of human growth which fail to pay careful attention to the socio-economic factors can be regarded as satisfactory, for the evidence strongly suggests that there are few, if any aspects of the growth process, which are not affected by these factors". Eveleth and Tanner (1966) states that "a child's growth rate reflects, better than any other single index, his state of health and nutrition, and often indeed his psychological situation also". They further state that child growth studies, comprising even average values of height and weight, can reflect accurately the state of nation's health and the average nutritional status of its citizens, when appropriate allowance is made for differences,
If any, in genetic potential. So, growth studies of various population groups living in different environmental conditions are important to evaluate the nutritional status, as well as the rate and pattern of their bodily growth. By studying height and weight many anthropologists have given biotypologies for different races (Krechmer, 1975, Sheldon, 1940). Study based on height and weight can also provide important information on children's growth status and progress. They serve as the simplest of size, form and to some extent physique pattern of an individual or a group of these, mention may be made Palmer et al, 1935, 1937; Scott, 1955, 1961; Stoudt et al, 1960; Berry, 1965; Malina, 1968; Sargent, 1963; Tanner and O'Keeffe, 1962; National Centre for Health Statistics, 1965, 1970; Malcolm, 1969, 1970. Controversial concept of Brozek (1956 a) emphasized that height and weight alone do not give an adequate picture since certain important variables indicative of skeleton size have not been taken into account.

Skinfold thickness measurements are of particular significance because these measurements provide valuable information about the caloric aspects of nutritional status (Singh, 1966). Mayer (1959) stated that measurement of skinfold thickness appears to be the simplest and most practical available method of determining obesity. Malina (1966) studied 1097 white and Negro school children and came to the conclusion that, there is a considerable variation in triceps skinfold associated with age, sex and race. Changes in subcutaneous
fat as measured by triceps skinfold describe different patterns for males as compared with females. It is particularly interesting that at the same ages when males showed their spurt females have been reported to show deceleration in skinfold growth (Tanner and Whitehouse, 1962; Mallina, 1966). Singh (1966) made comparative study on adult males of two income groups of Nutrition Research Laboratories and Research Laboratories, Hyderabad and came to the conclusion that subcutaneous fat thickness at all the sites are inter-correlated but under field circumstances measurements at minimum sites may also provide valuable information about subcutaneous fat. The measurements at triceps alone may be preferred over other sites and it is easier to make true skinfold at triceps. This view is in line with the earlier workers of Western Countries (Committee on Nutritional Anthropometry, 1956; Food and Agriculture Organization of the United Nations, 1957; Tanner, 1959). Recently triceps skinfold measurements have been used in connection with arm circumference to provide an estimate of arm muscle circumference as an index protein calorie malnutrition (Jelliffe, 1966; Jelliffe and Jelliffe, 1969). Watson studied correlation of arm circumference, skinfold thickness and arm diameter with fat layer of Indian women.

In India the field of human growth has been very little exposed to scientific enquiry. No doubt, some studies have been made on certain populations of India by medical specialists and Nutritional experts, but, they are concerned
with socio-economic influences on pre-adolescent growth rather than constructing growth norms for different parts of the country (Rao and Bhattacharjee, 1953; Madhavan et al., 1961; Rahman, 1936; Aykroyd and Rajagopal, 1936; Aykroyd and Krishnan, 1937; Aykroyd et al., 1938; Wilson et al., 1937; Fabisch and Hamburger, 1941 and Gupta and Bhownik, 1973). In recent years more and more scientists are now taking interest in the systematic study of growth of different populations of India. Physical Anthropologists have studied the phenomenon of human growth with emphasis on ontogenetic changes in body size and proportions on various periods of life. Sharma (1963) carried out a systematic growth study among the Maharashtrian girls of Central India. Das (1971) attempted to show the standard of growth of Kalita children of Assam and reported the age at which adolescence begins. Other pioneer work of authors in this field are - Krishnan and Vareed (1939, 1933), Aykroyd and Rajagopal (1936), Aykroyd and Krishnan (1937), Wilson et al. (1937), Aykroyd et al. (1938), Krishnan and Mitra (1938), Rajgopal (1938), Shourie (1933), Wilson and Mitra (1938), Krishnan (1939), Mitra (1941, 1942, 1943), Bhave (1941), Patel (1945), Majumdar (1949), Majumdar and Bahadur (1951), Ramat (1951), Rao et al. (1954), Warta et al. (1956), Ramanathan et al. (1955), Ila Devi (1958), Banerjee and Sen (1951), Banerjee and Bhattacharya (1961), Sharma (1963), Mahapatra (1965), Singh (1966), Berry et al. (1968), Ramachandran et al. (1968), Jopalan and Narsinga Rao (1968), Shadka

In 1972 Indian Council of Medical Research Technical Report Series No. 12 reports the standards of growth and physical development of Indian infant and children, aged 1 to 71 years, for each of the states of India.

In the International Symposium on Human growth, held in Feb. 1980, in Patiala, various studies on growth and development on various populations of India and abroad were reported.

The present study entitled "Growth Trends of Saryupari Brahmin Girls of Chhattisgarh" contributes towards the field of human growth. A humble attempt has been made in this study to report rate and pattern of physical growth and the age at which adolescence begins among Saryupari Brahmin Girls of Chhattisgarh.

The Problem

The foregoing brief review of some of the available relevant literature clearly indicates that there are ample scopes for studying various aspects of the growth study as very little work with regards to this aspect has been done in this part of the country.
India is a vast country with a large number of population groups. Saryupari Brahmins (S.B.) of Chhattisgarh is one of the oldest endogamous groups of this region. But, unfortunately no investigation on the rate and pattern of growth of Chhattisgarhia has yet been carried out. Thus there is an urgent need of study to provide adequate and comprehensive description of growth studies of Chhattisgarhi boys and girls. In view of this, the present study on physical growth among Chhattisgarhi Saryupari Brahmin (S.B.) girls has been undertaken.

The results of the present study seem to provide, the first series of growth data on the Chhattisgarhi S.B. girls to understand growth patterns from childhood to maturity with respect to various somatometric measurements and certain body proportions.

An attempt has been made to study the adolescent growth spurt and correlations between certain somatometric measurements and skinfold measurements of S.B. girls of Chhattisgarh.

The assessment of differential maturity levels among the various variables has been made and simple linear regression equations fitted to certain biological pairs to predict the proportional growth of body.

Besides this an attempt has also been made in this study to compare growth patterns of the Chhattisgarhi S.B.
girls with certain populations of India and different countries.

The study would also provide the base line information on ethno-regional variation in the rate and pattern of growth of Chhattisgarhi S.B. girls. The study would further reveal norms and standards for growth of S.B. girls of Chhattisgarh.

This would be the first scientific study on any population of the Chhattisgarh region and an attempt has been made to collect suitable data for the construction of reference standards of physical growth of Chhattisgarhi S.B. girls aged between 5 to 18 years. It is hoped that it will provide the base line information on the physical growth of normal children of this region.