Growth at Adolescence among Boys of Chittoor District, Andhra Pradesh

D. Ravi Prakash

Research Scholar, Dept. of Anthropology, Sri Venkateswara University, Tirupati-517502, India

Abstract: *The present study is undertaken on school going children of mixed population of Chittoor District, Andhra Pradesh with an aim to observe growth trends among them and locate the adolescent growth spurt for various growth characteristics. The present study is exploratory in nature, a cross sectional method has been employed to collect data from 320 boys aged between 10-17 years. Altogether 12 measurements like stature, sitting height, upper extremity length, lower extremity length, biacromial breadth, biiliocristal breadth, head length, head breadth, upper arm circumference, chest circumference, head circumference and weight are taken. Three out of four linear measurements i.e. stature, upper extremity length, lower extremity length show the peak velocities in the age group of 12+ years. Upper arm circumference shows higher magnitude of growth in the age groups 15-16 and 16-17, whereas 16-17 years are grow at least increment for chest circumference. Increments with regards to head circumference are evenly distributed throughout all the age groups. The composite measurement of weight shows a study and uniform progression through all the age groups with 16-17 years regarding the maximum increment. At conclusion present cross-sectional study indicates the nature of growth trends among boys shall help to draw a final conclusion regarding adolescent age group i.e. 10-17 years.*

Keywords: Mixed Population, Growth Trends, Growth Spurt, Peak Velocities, Progression

1. Introduction

The main purpose of studying growth in children is to assess the normal growth pattern and development pattern in a community to identify their changes in time and space. In recent years Indian Council of Medical Research and several other workers in different parts of the country have shown interest in establishing regional norms of growth based on age, sex, birth order and nutrition. Growth studies are also useful in detection of disease conditions and abnormal trends.These into serve as the base line for knowing the health status of children and in directly that of the community. The increase in the body size of a living being from birth to a certain period when maximum size is achieved may be called growth. But Garn (1952) considered growth as changes in magnitude, increment in the size of organs, increase in the thickness of tissue and changes in the size of an individual as a whole through time.

Growth studies include a multitude of phenomena from cell division to the standard curves of different body measurements from which one can understand the growth pattern. So growth study is an important aspect in human biology. The term growth refers to those changes which are concerned with magnitude, increments in the size of organs or individuals and development refers to thickness of tissue.

Growth may be defined in terms of rate of changes. Each individual growth pattern is unique and the growth period is divided in to several periods. Growth is the progressive addition to the bodymass in a three dimensional setting which is suited, and as well monitored by many characters such as genetic constitution, socio-economic and cultural bearing along side with the accomplishment of the component to the ever changing conserving nature of the environment. The child's growth does not proceed at a regular rate at any stage but is characterized by alternate periods of acceleration and deceleration. Physical development of a child is dependent upon many factors such as race, family history, hereditary influence, endocrine system, a balance of emotional factors, all enter into the picture and one has to consider all the factors in the child's ongoing physical development.

However, there is a universal pattern of growth curve in man all over the world reflects accelerated growth at early childhood and adolescence each followed by a period of slow rate of increment. (Band1946), (Barker and Steno 1936), (Hootan 1932). There are more studies on adolescent growth and puberty among girls than boys due to technical difficulties although there is little doubt that puberty is later in males. Sorrecit (1941), Schonfield (1943), Ellise (1946) and Grandlich and Turner (1962) have reported on male puberty and growth.

Gahi and Sandhu (1968) studied the physical growth among the Delhi children and found bisexual differences in growth. Dika (1969) studied the adolescent growth among the Oriya urban boys and girls and reported that the mean stature of boys is highest of all the age groups. The mean stature of Oriya girls is high except in last stage. In all the Indian populations, adolescent spurt occurs earlier among girls than boys. The higher stature of Oriya boys and girls may be due to their urban origin. Singh (1970) based on fivesomatometric measurements among Punjabi boys of 11-18 years, the rural boys attaining puberty earlier than urban boys. DattaBanik et.al. (1973) studied the growth patterns of Delhi school children in relation to nutrition and adolescence. Malik and Singh (1978) studied the growth trend among the male boys of Ladakh and observed the differences between the age groups 11 to 18 years assuming that the rapid growth would practically less by about 17-18 years. Nirmalananda Reddy (1980) studied adolescent growth and development among Bhil boys of Rajasthan and observed their rates of growth are among the lowest , but yet not least in India.

Nirmalananda Reddy and Mukhergee (1975) through their study among the boys of lower economic group of Renigunta have shown a considerably lower growth rate and maturation in their samples compared to their counter parts in India and outside particularly with respect to transverse dimensions and body weight. VijayaRaghavan's (1971) study of adolescence in Hyderabad revealed better growth rates in higher-socio-economic strata of urban areas. Vani (1972) worked on growth and nutritional status of pre-school children of urban and rural parts of Chittoor District and found that in first 4 to 5 months of life in well nourished children, all anthropometric measurements are above U.S standards. But they are relatively lower during the second year of life period. In third year they are more or less similar to U.S.standards. Sathyavathi (1977) worked on the rural and urban boys of Chittoor District and found that the growth spurt much less apparent in rural boys. It is not known whether the differences in growth rates due to urban rural origin or socio-economic levels and hereditary or environmental influence. Srinivasulu (1983) worked on the balija boys aged 10 -18 years of Tirupati and found that the growth rate of linear measurement of stature , sitting height and total arm length reaches its maximum during 12 to 13 years, which shows a marked early adolescent spurt. Early maturing boys are on the average heavier than late maturing boys throughout the adolescent period.

2. Material and Methods

The material and methods utilized for the present study includes the back ground information collected regarding the children studied. The nature of bodily measurements, as well as the design at statistical analysis and different methods of approach to growth and development adopted in this study. The anthropometric and other data have been collected from 320 school going children (only boys) of ChittoorDistrict of Rayalaseema area. The ages of the boys ranges from 10 to 17 years. The samples were taken from M.P.Elementary school, M.R.Palli.Z.P.HighSchool ,Mallamgunta, Z. P. High School, PerumallaPalli, Z.P.High School , M.R.Palli , S. V. Junior college , Tirupati. All the subjects include in the study are apparently in good health at the time of investigation. To assess the socio-economic conditions of the subjects , the details of occupation and income of their parents are collected by employing a separate schedule. The date of birth of the subjects is noted from the school records. The somatometric measurements of linear, breadth, girth and body weight have been taken employing the standard techniques and instrument according to Weiner and Lowrie (1981) and Singh and Bhasin (1968). The first step in the study of growth and development is obviously the classification of different age groups through which the process of growth or development is studied. In a cross-sectional study in which the subjects are not measured exactly on their birthdays it is necessary to classify the ages into groups of equal intervals usually one year. For example, in a given age group of 10-11 years are included boys aged 10 to 10.99 years. Thus the age group of 10-11 years

children are who have completed their 10th birthday and not reached their 11th birthday at the time of data collection.

3. Results and Discussion

The present study has been carried on school going children of heterogeneous population aged from 10 to 17 years. It is a cross-sectional growth study through which an attempt has been made to find out growth pattern among boys. Altogether 12 measurements consisting of linear, girth and volume measurements are taken. The size of the sample is 320. To understand the growth pattern among these children, the data was analyzed using statistical measures suchas mean, SD, SE, CV, growth increments, percentage growth mean curves and increment curves are drawn from their values. The samples are said to beat random and norelated subjects are considered inany group. All the subjects are maintaining good health at the time of investigation. Care is taken to include such of those subjects whose date of birth are accurate and are compared with their birth extract the international conversion of expressing the age through decimal is followed.

All the twelve measurements are stature, sitting height vertex, upper extremity length, lower extremity length, biacromial breadth, biiliocristal breadth, head length, head breadth, upper arm circumference, chest circumference, head circumference and weight. All these measurements show progressive increase in successive years from 10 to 17 years of age. However, the magnitude of difference differ from one measurement to the other measurement. Three out of four linear measurements i.e. stature, upper extremity length, lower extremity length show the peak velocities in the age group of 12+ years. The two transverse measurements i.e. biacromial and biiliocristal breadths show more than one peak value and their velocities are somewhat more in the later age groups. Head length and headbreath show similar trends of increments and the highest difference for both the measurements are found in the age group of 16-17 years. The three circumference measurements show three varying trends of growth rates. Upper arm circumference show higher magnitude of growth in the age groups 15-16 and 16-17, whereas 16-17 years are grow a least increment for chest circumference. Increments with regards to head circumference is evenly distributed throughout all the age groups. The composite measurement of weight shows a steady and uniform progression through all the age groups with 16-17 years recording the maximum increment.

4. Conclusion

The present study is an adolescent growth from 10+ to 17+ years among school going children of mixed population of Chittoor District with a total sample of 320 boys. This growth study aimed to finding out growth trends among them and locate the adolescent growth spurt for various growth characteristics.

Table 1: Mean, standard deviation and growth increments of anthropometric parameters.

Age in years		Parameters											
		HT	SH	UEL	LEL	BAB	BIB	HL	HB	UAC	CC	HC	WT
	Mean	131.91	64.72	58.72	67.10	29.13	19.76	16.95	12.58	16.99	58.67	51.16	24.97

10+	S.D	0.308	3.54	4.27	5.20	2.49	1.05	0.77	0.89	1.21	3.48	2.77	3.74
	G.I	5.79	3.48	1.59	3.07	0.91	0.41	0.03	0.41	0.33	3.15	0.29	3.93
11+	Mean	137.7	68.2	60.31	70.17	30.04	20.17	16.98	12.99	17.32	61.82	51.45	28.9
	S.D	7.88	3.86	4.64	5.45	2.22	1.52	1.91	0.47	2.86	3.63	3.15	5.15
	G.I	4.65	1.22	3.53	2.55	1.60	0.8	0.14	0.22	0.85	1.54	0.55	2.70
12+	Mean	142.35	69.48	63.84	72.72	31.64	20.97	17.12	13.21	18.17	63.36	52.00	31.6
	S.D	7.09	3.78	4.29	4.62	2.12	1.82	0.72	0.69	2.10	3.64	1.99	6.59
	G.I	8.55	2.68	2.97	6.08	0.93	0.88	0.24	0.30	0.63	1.60	0.37	2.75
13+	Mean	150.9	72.10	66.81	78.8	32.57	21.85	17.36	13.43	18.80	64.96	52.37	34.35
	S.D	7.36	4.57	4.29	4.82	2.30	1.39	0.85	0.59	1.82	3.97	2.12	5.98
	G.I	4.25	1.30	2.65	2.20	1.94	0.96	0.07	0.30	0.59	2.08	0.98	3.30
14+	Mean	150.15	74.15	69.46	81.00	34.51	22.81	17.43	13.73	19.39	67.04	53.35	37.65
	S.D	8.23	4.82	4.63	4.40	2.66	2.45	0.97	0.42	2.13	4.93	2.37	6.57
	G.I	1.65	2.05	0.22	0.35	0.91	1.03	0.07	0.08	0.90	3.24	0.73	3.76
15+	Mean	156.8	75.45	69.68	81.35	35.42	23.84	17.50	13.81	20.29	70.28	54.08	41.41
	S.D	9.5	5.07	4.39	3.87	2.80	4.68	1.08	0.68	2.12	5.15	2.13	7.59
	G.I	4.4	0.17	0.42	1.57	1.07	0.93	0.40	0.13	1.36	2.35	0.02	3.17
16+	Mean	161.2	75.62	70.10	82.92	36.49	24.77	17.90	13.94	21.65	72.63	54.10	44.58
	S.D	4.78	2.98	3.96	2.55	1.73	1.22	1.35	0.60	1.28	2.47	1.95	5.24
	G.I	1.7	4.83	1.33	2.69	0.34	0.90	0.72	0.21	1.48	0.62	1.01	7.52
17+	Mean	162.9	80.45	71.43	85.61	36.83	25.67	18.63	14.43	23.13	73.25	55.11	52.10
	S.D	7.19	3.41	4.42	4.49	2.40	1.11	2.10	0.68	1.65	3.91	2.21	7.25

S.D= Standard deviation, G.I= Growth increments, HT= Height, SH= Sitting height, UEL= Upper extremity length, LEL= Lower extremity length, BAB= Biacromial breadth, BIB= Biiliocristal breadth, HL= Head length, HB= Head breadth, UAC= Upper arm circumference, CC= Chest circumference, HC= Head circumference, WT= Weight.

5. Acknowledgement
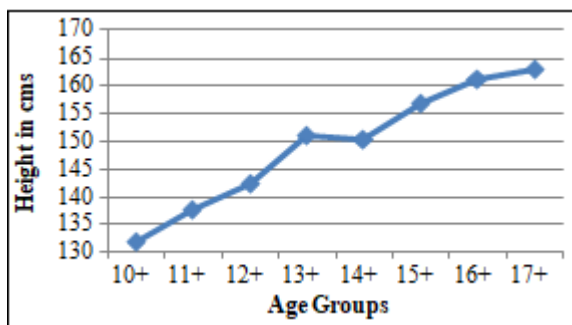
Figure 1: Mean curve of Stature
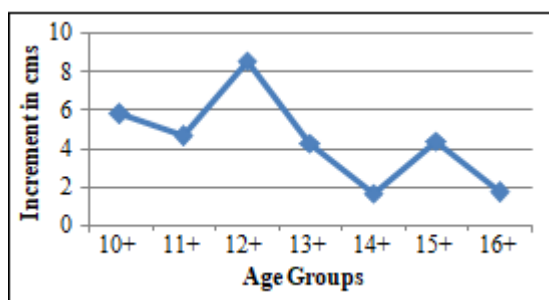
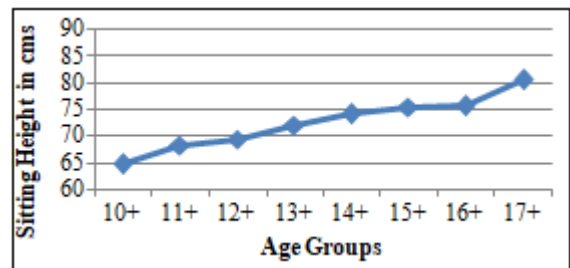**Figure 2:** Increment Curve of Stature

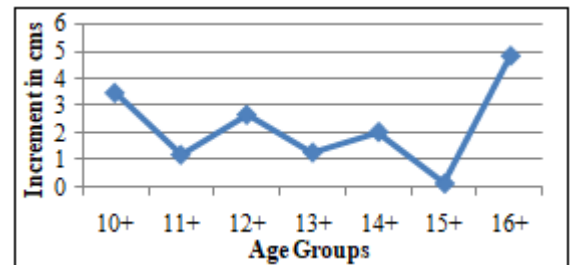**Figure 3:** Mean Curve of Sitting Height

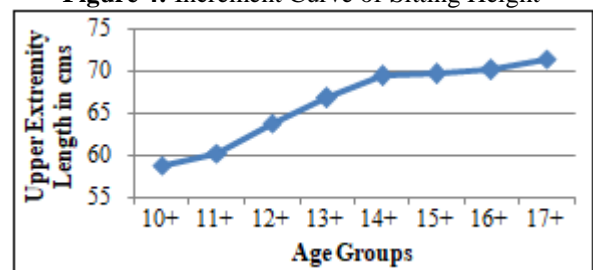**Figure 4:** Increment Curve of Sitting Height

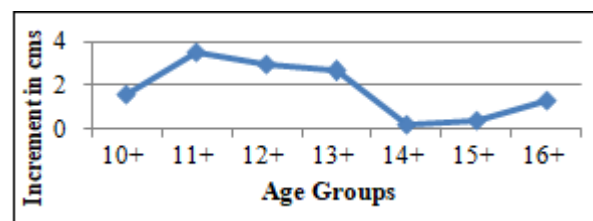**Figure 5:** Mean Curve of Upper Extremity Length

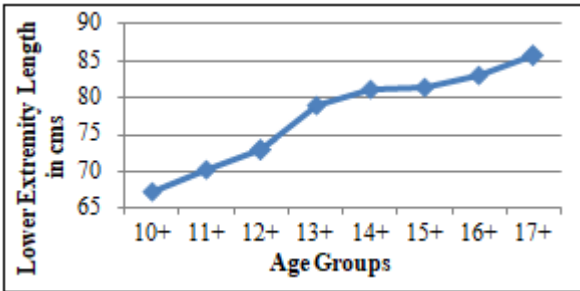**Figure 6:** Increment Curve of Upper Extremity Length

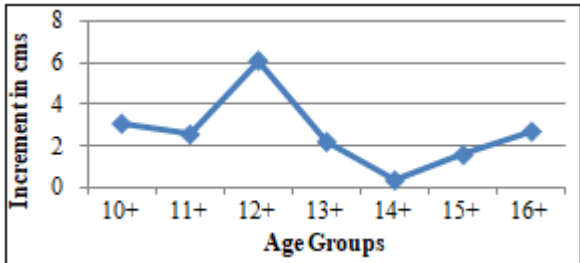**Figure 7:** Mean Curve of Lower Extremity Length

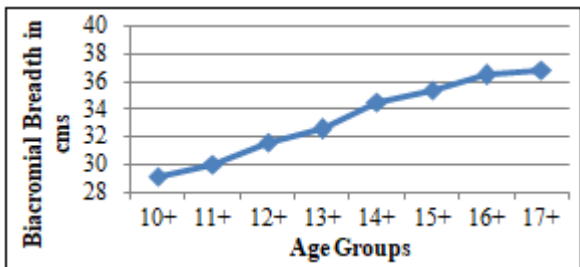**Figure 8:** Increment Curve of Lower Extremity Length

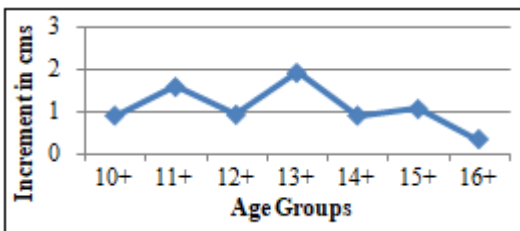**Figure 9:** Mean Curve of Biacromial Breadth

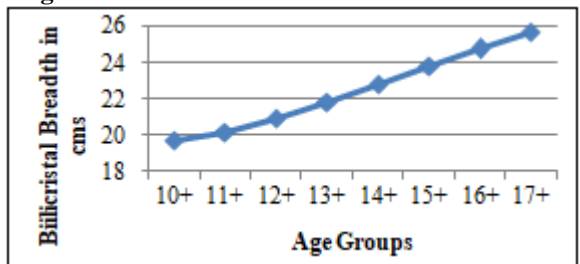**Figure 10:** Increment Curve of Biacromial Breadth

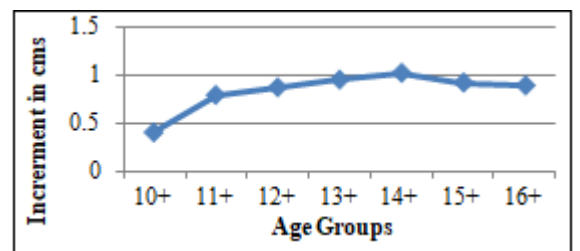**Figure 11:** Mean Curve of Biiliocristal Breadth

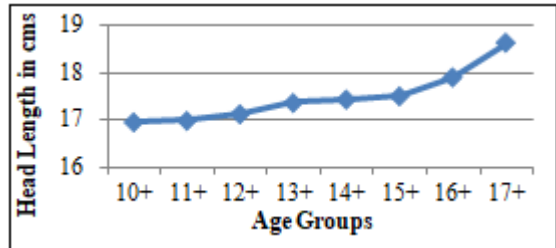**Figure 12:** Increment Curve of Biiliocristal Breadth
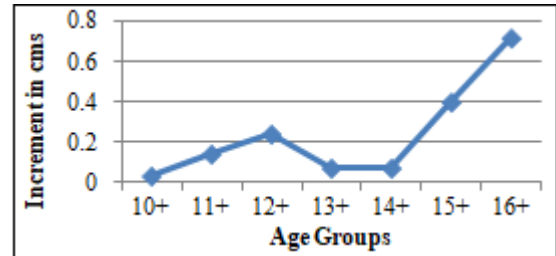

Figure 13: Mean Curve of Head Length
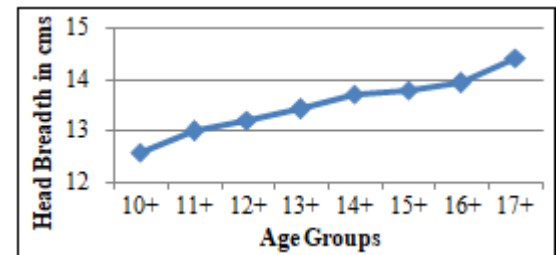

Figure 14: Increment Curve of Head Length

Figure 15: Mean Curve of Head Breadth
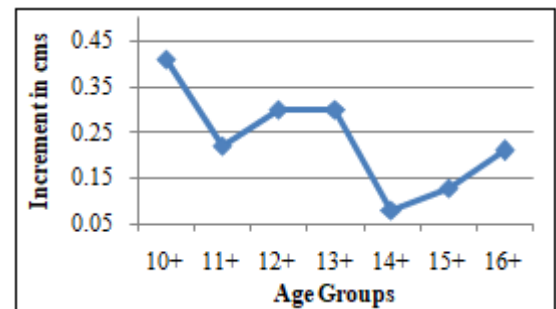
Figure 16: Increment Curve of Head Breadth
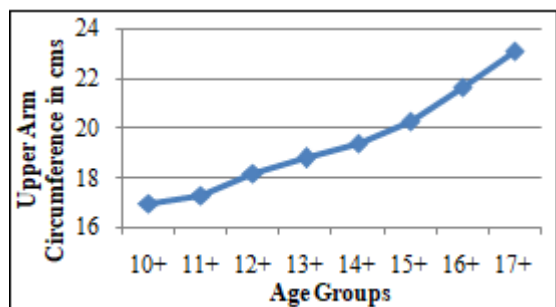
Figure 17: Mean Curve of Upper Arm Circumference
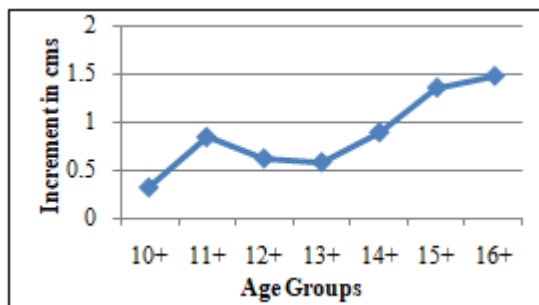
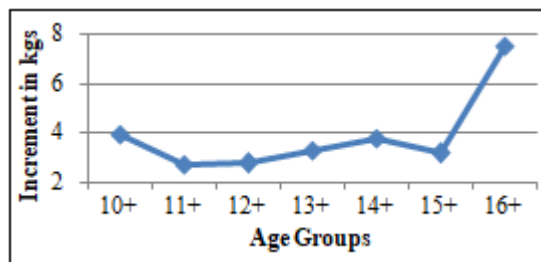**Figure 18:** Increment Curve of Upper Arm Circumference

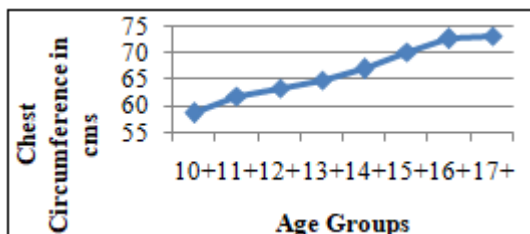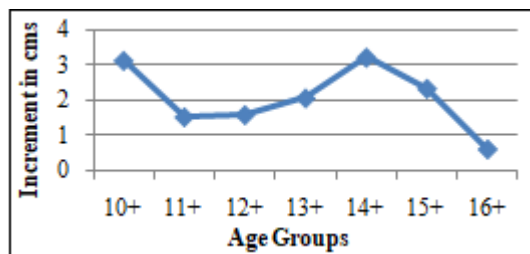**Figure 19:** Mean Curve of Chest Circumference

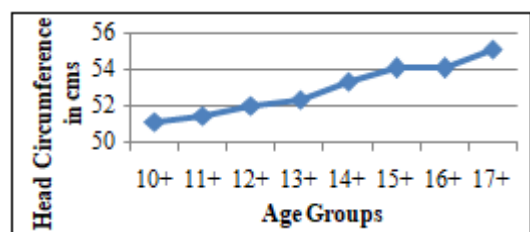**Figure 20:** Increment Curve of Chest Circumference
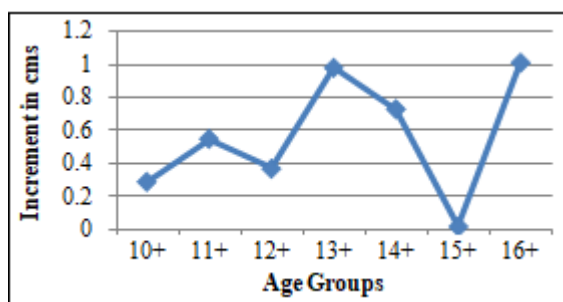

Figure 21: Mean Curve of Head Circumference

Figure 22: Increment Curve of Head Circumference
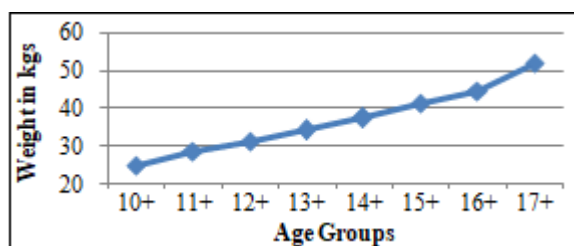

Figure 23: Mean Curve of Weight

Figure 24: Increment Curve of Weight

References

[1] Abdul Rashid Ghani, I.C Varma, O P Ghai 1971, Physical growth of school children in Delhi Ind.Pediatrics 38:311-423.

[2] Bansan, I.J.S. 1969a, Head dimensions of Punjabi boys and girls aged 6-15 years, Indian journal of Pediatrics 36; 261-270.

[3] DathaBanik N.D SushilaNayar; R. Krishna, S. Baksi and A.D Tasker, New Delhi 1973, Growth pattern of Indian School Children in relation to nutrition and adolescence Ind. J. Pediatrics 40; 173-179.

[4] Elisha R. Richardson and Shyam K. Malhotra 1974, Vertical growth of the anterior fuce and curium in inner city Negro children Amer.J.Phys.Anthropology 41(4):361-365.

[5] Gupta P. R Dutta, A.K. and Dutta P. 1978 Growth and Development across seasonal study of pre-schools children Ind.J.Pediatrics 45:189-195.

[6] Malik S. H and Singh J.P. 1978. Growth trends among boys of ladakA high altitude population A.M. J Phy. Anthropology 48: 171-176.

[7] Sathyavathi, K 1977 Physical Growth Characteristics of adolescence in Chittoor District of Andhra Pradesh M.Sc., Thesis, Sri Venkateswara University, Tirupati, A.P.

[8] Singh S.P and Sindhu L.S 1979, Physical growth for pre-pubertal Punjabi girls Ind. J. Pediatrics 46; 346-352.

[9] Srinivasulu A.1983. Growth and development among the Balija Boys 10-18 years of Tirupati, Andhra Pradesh. M.Phil dissertation, S.V. University, Tirupati.

[10] Trivedi B. K Srivastava, B.C and Maheswari B.B Kanpur 1971. A study of height and weight of Primary School Children of rural area, near Kanpur Ind. J. Pediatrics 38:20-26.

[11] UshaDeka, Mahapatra 1969, Growth during adolescence among Oriya Urban boys and girls J. Ind. AnthropoSoc 4(2) 141-146.

[12] Vani Y.K 1972. A study of growth and nutritional status of pre-school children (3-5 years) as associated by Quick sticks method is rural areas of Chittoor District, M.Sc., dissertation S.V. University, Tirupati.

[13] Xaviour, B. 1979. Growth among the school children, M.Sc dissertation submitted to S.V.University, Tirupati.