

A Cross-sectional Study of Certain Linear, Transverse and Circumferential Dimensions Among Chenchu Tribal Girls of Andhra Pradesh

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ABSTRACT A cross-sectional purposive random sample of 286 Chenchu girls ranging in age from '0' through 18 years were selected to study the growth patterns on the basis of two linear, four transverse and one circumferential dimensions. These physical traits increase with increase in age.

Several studies of physical growth in tribal population have observed that with the advancement in age, there is a tendency for increase in all the physical traits (Sharma, 1970; Singh, 1980; ICMR, 1984; Jhingon and Nath, 1985; Nath et al., 1991). Many researchers have tried to enumerate the trend of growth under different situations all over the world, but little attention has been paid on tribal populations. In the present study an attempt has been made to study the effect of age from '0' through 18 years on seven anthropometric measurements of Chenchu tribal girls.

MATERIAL AND METHODS

The Chenchus a food gathering tribe, is predominantly found in Nallamalai hills which are a part of Eastern Ghats. They are spread over in six districts, i.e., Prakasam, Kurnool, Guntur, Mahaboob Nagar, Nalgonda and Ranga Reddy districts of Andhra Pradesh. As these hills are abundant with flora and fauna, the Chenchus are subsisting on food gathering and hunting of wild animals. The Chenchus are divided into 4 endogamous sub-divisions : i) Adavi Chenchus, ii) Deva Chenchus, iii)

Bontha Chenchus, iv) Krishna Chenchus. For details see Rao and Busi (1994).

The material of the present study was based on a cross-sectional data collected on 286 Chenchu girls drawn from 9 scheduled tribal schools of Pedda Dornala mandal of Prakasam district and 3 schools of Scheduled Tribes from Atmakoor mandal of Kurnool district of Andhra Pradesh during the months of December 1992 to January 1993. The age of these subjects range from '0' to 18 years. The age of each individual was calculated to three decimal places after Tanner et al. (1966).

The measurements on each individual were taken during the working hours of the schools. The bilaterally represented measurement such as height of anterior iliac spine was taken on the left hand side of the subject. The measurements—sitting height, height of anterior iliac spine, biacromial diameter, biiliocrystal diameter, transverse chest and antero-posterior chest were taken after Weiner and Lourie (1969). The measurements were taken by the first author.

The whole year mean increments have been calculated by subtracting the mean of the preceding age group from that of the succeeding age group. Growth velocity is increment per unit time of a measurement that is constantly grow-

ing and the concept is well understood if growth is thought of as form of motion (Tanner, 1964). The values for a growth velocity of a measurement are easily obtained by subtracting for that variable say at age 'A' from its mean value at age (A+1 year) is as below.

$$\text{Velocity (V)} = X(A+1) - X.A$$

Growth gradients of measurements (Biological variables) expresses the percentage of growth achieved at the age 'A' of its final value as seen in a full grown adult. In the present study the growth gradient have been obtained on the basis of 18 year final value, as measurements for individuals above that age were not taken.

Arithmetically 'Growth gradient' may be expressed as:

$$\text{Growth gradient} = X A / M \times 100$$

where

X A - Mean value of a measurement at age 'A'

M - Maximum mean value of that measurement in the highest age group.

RESULTS AND DISCUSSION

Mean values, standard deviations for seven anthropometric variables have been listed in table 1. It can be inferred from the table that the mean values for all of these physical traits increase with advancement of age with a few fluctuating discrepancies of a minor nature because the data are cross-sectional. The annual increments are not uniform. The mean sitting height of infant at '0' group was about 39 cm. The sitting height increases one and half times by 6 years. An increment of 15 cm was noticed from 7 to 18 years (Table 1). The mean height of anterior iliac spine of infant at '0' group was 27 cm, it was doubled by 5 years, thrice by 11 years. An increment of 9 cm was noticed from 12 to 18 years (Table 1). The mean biacromial diameter of infant at '0' group was about 14 cm and it was doubled by 11 years. An increment of 13 cm was noticed from 12 to 18 years (Table 1). The mean biilio-cristal diameter

of infant at '0' group was about 12 cm and it was one and half times by 7 years and doubled by 14 years. An increment of about one cm was noticed from 15 to 18 years (Table 1). The mean transverse chest of infant at '0' group was about 13 cm and it was one and half times by 10 years. An increment of 3 cm was noticed from 11 to 18 years (Table 1). The mean antero-posterior chest of infant at '0' group was about 10 cm and it was one and half times by 10 years. An increment of 3 cm was noticed from 11 to 18 years (Table 1). The mean chest circumference of infant at '0' group was about 38 cm and it was one and half times by 8 years and doubled by 18 years (Table 1). The sitting height, height of anterior iliac spine, transverse chest, antero-posterior chest and chest circumference showed maximum growth rate between '0' and 1 year, and biacromial diameter and biiliocrystal diameter showed maximum growth rate between 1 and 2 years, and from 3 years of age the rate of growth declined. The juvenile spurt of sitting height (5.10 cm), height of anterior iliac spine (6.16 cm), biacromial diameter (2.34 cm), and biiliocrystal diameter (1.22 cm) was attained between 4 and 5 years which is early by one year when compared to transverse chest (0.97 cm), antero-posterior chest (1.10 cm), and chest circumference (2.39 cm) (Table 2). The adolescent growth first spurt of sitting height (5.66 cm), height of anterior iliac spine (6.61 cm), biacromial diameter (2.09 cm), biiliocrystal diameter (1.83 cm), transverse chest (1.30 cm), antero-posterior chest (1.74 cm), and chest circumference (3.98 cm) was attained between 10 and 11 years. Apart from the adolescent spurt all the measurements showed a second spurt for the lower intensity. The spurt occurred between 12 and 13 years whereas in the case of chest circumference the spurt occurred between 13 and 14 years which was found to be delayed by one year than the other variables.

The occurrence of second growth spurt in case of all the seven measurements is probably due to the fact that the Chenchu girls, as they belong to a tribal set up, lack many resources

Table 1 : Mean, standard deviation of seven anthropometric variables on trunk and extremity among Chenchu tribal girls of Andhra Pradesh

Age (in years)	N	Sitting height		Height of anterior iliac spine		Bilioacristal diameter		Biacromial diameter		Transverse chest		Antero posterior chest		Chest circumference	
		X	S.D.	X	S.D.	X	S.D.	X	S.D.	X	S.D.	X	S.D.	X	S.D.
0	6	39.08	2.01	27.41	2.53	14.50	0.54	12.41	1.35	12.91	1.11	9.75	1.08	38.41	1.85
1	13	44.38	4.87	35.13	3.39	16.30	1.49	13.80	1.24	14.69	1.45	11.50	1.36	43.76	2.94
2	10	48.80	3.87	40.16	9.45	18.33	2.37	16.05	2.25	14.89	1.41	11.58	1.68	46.95	2.89
3	10	53.46	3.09	46.42	2.81	19.21	1.35	15.29	0.82	15.38	1.66	11.93	0.93	48.56	2.78
4	15	52.27	3.41	52.30	7.33	19.76	1.65	15.98	1.00	15.74	0.98	12.05	0.82	50.73	4.52
5	16	57.37	2.60	58.46	3.92	22.10	1.25	17.20	0.83	15.85	0.88	12.46	0.49	52.45	2.03
6	26	58.57	2.37	63.71	5.51	23.53	1.44	17.98	0.80	16.82	0.68	13.56	0.54	54.84	2.58
7	28	59.95	4.20	66.11	5.64	24.28	1.47	18.34	0.92	17.36	1.05	13.79	0.99	55.13	2.74
8	30	62.52	1.85	71.20	3.77	25.62	1.22	19.10	0.98	17.99	0.62	14.19	0.73	57.17	2.06
9	19	64.62	2.81	74.14	3.78	26.45	1.80	19.71	1.07	18.54	1.22	14.96	1.38	59.62	3.04
10	13	65.09	6.46	76.04	6.68	26.81	1.81	20.07	1.20	18.76	1.17	14.76	1.39	60.03	3.29
11	10	70.75	6.62	82.65	4.30	28.90	1.37	21.90	1.98	20.06	1.27	16.50	2.03	64.01	6.28
12	11	68.32	2.51	79.30	6.74	29.40	2.90	21.99	1.99	19.19	1.13	16.00	0.97	64.95	3.36
13	10	71.49	2.89	84.38	5.45	31.26	2.91	23.71	1.35	20.94	0.84	17.26	1.52	68.99	5.46
14	10	73.19	3.83	86.28	3.26	32.38	1.84	24.50	0.88	21.95	0.71	18.09	0.93	73.64	4.39
15	10	73.27	3.24	89.11	5.27	31.13	2.38	24.74	1.23	21.64	0.98	17.47	0.97	71.65	2.96
16	10	72.26	2.28	88.99	4.29	32.86	1.02	24.53	1.19	22.32	1.34	18.02	0.87	73.90	2.33
17	10	75.15	4.72	88.38	5.33	31.78	2.33	24.71	1.63	22.63	1.67	18.61	1.89	74.51	8.06
18 & above	29	74.59	2.76	88.32	4.49	32.09	1.43	25.10	1.27	22.28	1.20	18.53	1.38	75.80	4.05

and belong to the lower socio-economic level of the society. As a result inadequacy in their nutritional intake causes poorer health condition in general there by affecting their general pattern of growth causing bimodality of growth spurt. The cross-sectional nature of data appears to be not responsible for causing the bimodality as Nath (1972) reported normal unimodal curves on a sample of Jat boys of Meerut, Uttar Pradesh (India) and also Nath (1985) reported bimodality curves on a sample of Warli tribal boys of Maharashtra, belonging to a similar socio-economic strata as that of the Chenchu. Increase of the sample size could have smoothen the nature of the curves but this was not possible to collect a larger sample than present one in a tribal set-up where the study was conducted. The magnitude of annual increments is not uniform through out all age groups. The annual increments seems to be faster at younger age groups (Table 2).

All measurements show minimum maturity at '0' group and maximum at 17 years of age group. height of anterior iliac spine (100.89% at 15 years), biacromial diameter (102.39% at 16 years) and biiliocrystal diameter (98.56% at 15 years) matures earlier than sitting height (100.75% at 17 years). On comparing the two transverse measurements of the trunk, the cephalo-caudal gradients are clearly visible when we observe the biacromial diameter (102.39%) which matures earlier than biiliocrystal diameter (98.56%). On the other hand the maturity gradients of sitting height (100.75%) comparing with height of anterior iliac spine (100.89%) suggestive the caudo-cephalic gradient of growth as clearly visible. Perhaps this is the reason why Tanner (1964) speaks of the smaller area gradients' (as) being 'more complicated'. Tanners expression 'More complicated' is now to be viewed in the sense of caudo-cephalic gradients instead of cephalo-caudal gradients. This may, for the sake of brevity, be called reversal phenomenon (Table 3). The present study is in agreement with the works of Sidhu (1969) Nath (1972), Krishna Rao (1981), Jhingon and Nath (1985) and Nath et al. (1991), in terms of growth gradients.

It will be apparent from the foregoing results that the findings among Chenchu girls were almost similar to the findings of Singh (1980), Jhingon and Nath (1985), and also higher sitting height between 9-14 years and the rest were lower than the findings of Nath et al. (1991).

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Table 2 : Annual increments for seven anthropometric variables among Chenchu tribal girls of Andhra Pradesh

Age (in years)	Sitting height	Height of anterior iliac spine	Biacromial diameter	Biiliocrystal diameter	Transverse chest	Antero posterior chest	Chest circumference
1	5.30	7.72	1.80	1.39	1.78	1.75	5.35
2	4.42	5.03	2.03	2.25	0.20	0.08	3.19
3	4.66	6.26	0.88	-0.76	0.49	0.35	1.61
4	-1.19	5.88	0.55	0.69	0.36	0.12	2.17
5	5.10	6.16	2.34	1.22	0.11	0.41	1.72
6	1.20	5.25	1.43	0.78	0.97	1.10	2.39
7	1.38	2.40	0.75	0.36	0.54	0.23	0.29
8	2.57	5.09	1.34	0.76	0.63	0.40	2.04
9	2.10	2.94	0.83	0.61	0.55	0.77	2.45
10	0.47	1.90	0.36	0.36	0.22	-0.19	0.41
11	5.66	6.61	2.09	1.83	1.30	1.74	3.98
12	-2.43	-3.35	0.50	0.09	-0.16	-0.50	0.94
13	3.17	5.08	1.86	1.72	1.04	1.26	4.04
14	1.70	1.90	1.12	0.79	1.01	0.83	4.65
15	0.08	2.83	-1.25	0.24	-0.31	-0.62	-1.99
16	-1.01	-0.12	1.73	-0.21	0.68	0.55	2.25
17	2.89	-0.61	-1.08	0.18	0.31	0.59	0.61
18 & above	-0.56	-0.06	0.31	0.39	-0.35	-0.08	1.29

Table 3 : Percentage of growth achieved at each age by all the seven anthropometric variables of their final value taken at 18 years

Age (in years)	Sitting height	Height of anterior iliac spine	Biacromial diameter	Biiliocrystal diameter	Transverse chest	Antero posterior chest	Chest circumference
0	52.39	31.03	45.18	49.44	57.94	52.61	50.67
1	59.49	39.77	50.79	54.98	65.93	62.06	57.73
2	65.42	45.47	57.12	65.73	66.83	62.49	61.93
3	71.67	52.55	59.86	60.91	69.03	64.38	64.06
4	70.07	59.21	61.57	63.66	70.64	65.02	66.92
5	76.91	66.19	68.86	68.52	71.14	67.24	69.19
6	78.52	72.13	73.32	71.63	75.49	73.17	72.34
7	80.37	74.85	75.66	73.06	77.91	74.41	72.73
8	83.81	80.61	79.83	76.09	80.74	76.57	75.42
9	86.63	83.94	82.42	78.52	83.21	80.73	78.65
10	87.26	86.09	83.54	79.96	84.20	79.65	79.19
11	94.85	93.58	90.05	87.25	90.03	89.04	84.44
12	91.59	89.78	91.61	87.60	86.13	86.34	85.68
13	95.84	95.53	97.41	94.46	93.98	93.14	91.01
14	98.12	97.69	100.90	97.60	98.51	97.62	97.15
15	98.23	100.89	97.00	98.56	97.12	94.27	94.52
16	96.87	100.75	102.39	97.72	100.17	97.24	97.49
17	100.75	100.06	99.03	98.44	101.57	100.43	98.29

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