Physical Growth and Maturational Sequence of Cephalo and Facial Group Measures of Chenchu Tribal Boys of Andhra Pradesh

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KEY WORDS Growth. Anthropometry. Chenchu. Andhra Pradesh.

ABSTRACT The cross-sectional study was undertaken in schools situated in the Pedda Dornala mandal of Prakasam and Atmakoor mandal of Kurnool districts of Andhra Pradesh during December 1992 to August 1994. The sample consisted of 352 healthy Chenchu boys aged '0' to 18 years. The analysis of the data reveal that all head and face measurements attain adolescent growth spurt between 12 and 15 years. The maturational sequence of ceophalo-facial dimensions showed caudo-cephalic direction. The results were compared with other populations. The findings of the study can be used as a reference material for Chenchu tribal boys.

Most published studies on physical growth of Indian children and adolescents have been confined to different head and face measurements and their changing proportions. Those which have explored on Chenchu tribal boys are however negligible. Noteworthy among these are by Goldstein (1932), Shuttleworth (1939), Pandey et al. (1979), Krishna Rao (1981), Singhrol and Mitra (1985), Dharma Rao (1988), Reddy (1989), Dharma Rao and Busi (1994a, b, 1995) to mention a few. The present paper reports the six head and face measurements derived on the Chenchu tribal boys of Srisailam ITDA of Andhra Pradesh Pradesh.

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, Mahabub Nagar, Guntur, 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. For details *see* Dharma Rao and Busi (1994a). Data were collected, cross-sectionally on 352 Chenchu boys aged '0' to 18 years drawn from 9 scheduled tribal boys schools of Pedda Dornala mandal of Prakasam district and 3 scheduled tribal boys schools of Atmakoor mandal of Kurnool district of Andhra Pradesh during December 1992 to August 1994. The exact date of birth was collected for every subject from the concerned school registers. The age of each individual was calculated to three decimal places after Tanner et al. (1966). The measurements on individual were taken during the working hours of the schools with minimum clothing. The measurements—head length, head breadth, morphological facial height, bizygomatic diameter, nasal height and nasal breadth were taken after Weiner and Lourie (1969). The measurements were taken by the first author. The whole year mean increments and growth gradients have been calculated.

RESULTS AND DISCUSSION

Mean and standard deviation for all measurements have been depicted in table 1. It can be inferred from the table that the mean values for all the measurements are progressively accelerating for age. Standard deviations for these characters have not shown any consistent pattern as found in earlier study of Dharma Rao and Busi (1994a, b). The mean head length of infant at '0' group is 13.81 cm, it increases by 4 cm from '0' to 18 years. The highest annual gain (+0.57 cm per year) has occured between 12 and 13 years while maximum mean annual loss (-0.21 cm per year) is noticed between 14 and 15 years. The mean head breadth

Table 1: Mean, standard deviation of head and face anthropometric variables among Chenchu boys of Andhra Pradesh

Age in Years	*N*	*Head length*		*Head breadth*		*Bizygomatic diameter*		*Morphological facial height*		*Nasal height*		*Nasal breadth*	
		$\bar{X}$	*S.D.*	$\bar{X}$	*S.D.*	$\bar{X}$	*S.D.*	$\bar{X}$	*S.D.*	$\bar{X}$	*S.D.*	$\bar{X}$	*S.D.*
0	16	13.81	1.22	10.82	0.72	8.00	0.70	6.38	0.70	2.82	0.57	2.33	0.17
1	22	14.90	0.95	11.66	0.52	8.92	0.76	6.88	0.58	2.93	0.32	2.52	0.20
2	12	15.31	0.51	12.15	0.31	9.15	0.62	7.35	0.50	3.08	0.32	2.60	0.19
3	17	15.91	0.91	11.96	0.45	9.47	0.31	7.07	0.88	3.09	0.31	2.65	0.38
4	17	16.18	0.55	12.47	0.59	9.49	0.47	7.78	0.41	3.22	0.25	2.79	0.21
5	29	16.33	0.54	12.62	1.05	9.64	0.57	8.30	0.48	3.33	0.25	2.73	0.21
6	37	16.54	0.54	12.77	0.46	10.04	0.53	8.51	0.41	3.44	0.31	2.97	0.20
7	33	16.84	0.46	12.92	0.60	10.19	0.65	8.81	0.59	3.51	0.28	2.89	0.20
8	30	16.68	0.61	12.95	0.41	10.39	0.69	8.75	0.42	3.54	0.31	3.03	0.33
9	20	16.89	0.62	12.96	0.54	10.60	0.46	8.94	0.47	3.55	0.29	3.17	0.18
10	17	16.98	0.48	12.97	0.52	10.88	0.64	8.98	0.37	3.68	0.30	3.01	0.21
11	13	17.01	0.39	12.97	0.42	10.93	0.54	9.12	0.51	3.66	0.39	3.15	0.19
12	15	17.06	0.36	13.07	0.40	10.87	0.39	9.12	0.56	3.88	0.35	3.11	0.14
13	9	17.63	1.24	13.07	0.22	11.11	0.71	9.44	0.36	3.94	0.39	3.21	0.10
14	7	17.78	1.25	13.20	1.08	11.31	0.34	9.55	0.61	3.85	0.25	3.42	0.58
15	10	17.57	0.38	13.15	0.47	11.71	0.63	10.23	0.70	4.11	0.36	3.42	0.30
16	10	17.38	0.31	13.30	0.61	11.86	0.49	10.54	0.67	4.11	0.29	3.48	0.28
17	8	17.70	0.59	13.05	0.53	12.18	0.56	10.41	0.56	4.21	0.21	3.42	0.15
18 & above	30	17.95	0.57	13.41	0.43	12.29	1.19	10.35	0.84	4.20	0.22	3.52	0.31

Table 2: Annual increment for six head and face anthropometric variables among Chenchu boys of Andhra Pradesh

Age in years	*Head length*	*Head breadth*	*Bizygomatic diameter*	*Morphological facial height*	*Nasal height*	*Nasal breadth*
1	1.09	0.84	0.92	0.50	0.11	0.19
2	0.41	0.49	0.23	0.47	0.15	0.08
3	0.60	-0.19	0.32	-0.28	0.01	0.05
4	0.27	0.51	0.02	0.71	0.13	0.14
5	0.15	0.15	0.15	0.52	0.11	-0.06
6	0.21	0.15	0.40	0.21	0.11	0.24
7	0.30	0.15	0.15	0.30	0.07	-0.08
8	-0.16	0.03	0.20	-0.06	0.03	0.14
9	0.21	0.01	0.21	0.19	0.01	0.14
10	0.09	0.01	0.28	0.04	0.13	-0.16
11	0.03	0.01	0.05	0.14	-0.02	0.14
12	0.05	0.09	-0.06	0.00	0.22	-0.04
13	0.57	0.00	0.24	0.32	0.06	0.10
14	0.15	0.13	0.20	0.11	-0.09	0.21
15	-0.21	-0.05	0.40	0.68	0.26	0.00
16	-0.19	0.15	0.15	0.31	0.00	0.06
17	0.32	-0.25	0.32	-0.13	0.10	-0.06
18	0.25	0.36	0.11	-0.06	-0.01	0.10

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

Age in years	*Head length*	*Head breadth*	*Bizygomatic diameter*	*Morphological facial height*	*Nasal height*	*Nasal breadth*
0	76.93	80.68	65.09	61.64	67.14	66.19
1	83.00	86.95	72.57	66.47	69.76	71.59
2	85.29	90.60	74.45	71.01	73.33	73.86
3	88.63	89.18	77.05	68.30	73.57	75.28
4	93.64	92.99	77.21	75.16	76.66	79.26
5	90.97	94.10	78.43	80.19	79.28	77.55
6	92.14	95.22	81.69	82.22	81.90	84.37
7	93.81	96.34	82.91	85.12	83.57	82.10
8	92.92	96.56	84.54	84.54	84.28	86.07
9	94.09	96.64	86.24	86.37	84.52	90.05
10	94.59	96.71	88.52	86.76	87.61	85.51
11	94.76	96.79	88.93	88.11	87.14	89.48
12	95.04	97.46	88.44	88.11	92.38	88.35
13	98.21	97.46	90.39	91.20	93.80	91.19
14	99.05	98.43	92.02	92.27	91.66	97.15
15	97.88	98.06	95.28	98.84	97.85	97.15
16	96.82	99.17	96.50	101.83	97.85	98.86
17	98.60	97.31	99.10	100.57	100.23	97.15

at '0' group is 10.82 cm, it increase by 2 1/2 cm from '0' to 18 years. The highest annual increase (+0.15 cm per year) has attained between 15 and 16 years while the maximum mean annual loss (-0.25 cm per year) is noticed between 16 and 17 years. The mean morphological facial height at '0' group is 6 cm, it increases by 4 1/2 cm between '0' through 18 years. The highest annual increase (+0.68 cm per year) has occured between 14 and 15 years while the maximum mean annual loss (-0.28 cm per year) is noticed between 2 and 3 years. The mean bizygomatic diameter at '0' group is 8 cm, it increases by 4 cm at the end of 18 years. The highest annual gain (+0.40 cm per year) has attained between 14 and 15 years while the maximum mean annual loss (-0.06 cm per year) between 11 and 12 years. The mean nasal height and nasal breadth at '0' group is 2 cm, it increases by 2 cm and 1 cm, respectively by 18 years. The highest annual gain of nasal height (+0.26 cm per year) has occured between 14 and 15 years while the maximum mean annual loss (-0.09 cm per year) is noticed between 13 and 14 years. The maximum annual gain of nasal breadth (+0.21 cm per year) has attained between 13 and 14 years while the highest mean annual loss (-0.16 cm per year) is noticed between 9 and 10 years. The head length, head breadth, morphological facial height, bizygomatic diameter, nasal height and nasal breadth showed maximum growth rate between '0' and 1 year and from 2 years of age the rate of growth declined.

The juvenile spurt of head length (0.60 cm) is attained between 2 and 3 years, which is earlier by a year than head breadth (0.51 cm), morphological facial height (0.71 cm), nasal height (0.13 cm) and earlier by three years than bizygomatic diameter (0.40 cm) and nasal breadth (0.24 cm). The adolescent growth spurt of head length is attained between 12 and 13 years, which is earlier by a year than nasal breadth (13 and 14 years) and earlier by two years than bizygomatic diameter, morphological facial height and nasal height (14 and 15 years) and earlier by three years than head breadth (15 and 16 years (Table 2).

All measurements show minimum maturity at '0' group and maximum at 17 years of age group. In the facial group it is observed that morphological facial height (100.57%), nasal height (100.23%), bizygomatic diameter (99.10%) are early matured than cephalo group measurements *i.e.* head length (98.60%) and head breadth (97.31%). By combining these two groups–head length, head breadth late matured than bizygomatic diameter, morphological facial height and nasal height. This is suggestive of a caudo-cephalic gradient of growth in case of cephalo-facial measurements are clearly visible (Table 3). The present study is in agreement with the works of Krishna Rao (1981). Dharma Rao and Busi (1994a) in terms of growth gradients.

It will be apparent from the foregoing results that the findings among Chenchu boys were more or less similar to the findings of Goldstein (1932), Shuttleworth (1939), Tanner (1962), Pandey et al. (1979), Krishna Rao (1981), Singhrol and Mitra (1985) and Reddy (1989). The results generated in this paper can therefore be utilised as reference material for the Chenchu tribal boys in Srisailam ITDA of Andhra Pradesh.

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Blood Pressure and Anthropometric Variation in Rural Southeastern Andhra Pradesh

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KEY WORDS Blood Pressure. Hypertension. Body Mass Index. Age.

ABSTRACT The paper reports blood pressure as a marker of health in relation to body mass indices and fat fold thickness in rural southeastern Andhra Pradesh, based on a random sample of 150 healthy women aged 20-59 years. Systolic as well as diastolic blood pressure increased significantly with an increase in age upto 49 years. Body mass indices and triceps skinfold thickness positively correlated with systolic and diastolic blood pressure. 98% of the population is found to be normotensive while the remaining proportion constitutes hypertensives. Notwithstanding this finding, there is risk involvement to the population due to increased blood pressure with higher body mass indices, fat fold thickness with advanced age.

INTRODUCTION

Both epidemiological and experimental studies have established an association between the blood pressure and the risk of cardiovascular diseases (Lee, 1985). While hypertension is the leading cause of mortality and morbidity in the developed countries, it is an increasing health hazard of the developing countries, including India (Nerurkar and Taskar, 1986). Investigations carried out under different conditions by various research groups have shown positive correlation between blood pressure and age (Reddy et al., 1991), sex (Celine and Mathur, 1979), heredity (Nirmala and Chengal Reddy, 1992), body composition (Sambasiva Rao, 1983) and social status (Srivastava et al., 1977).

The best indicators of body composition are body mass index and skinfold thickness. These are also useful in the evaluation of obesity. That hypertension is positively correlated with obesity is revealed by the recent studies of Sambasiva Rao (1983) and Nirmala (1991). Knowledge about blood pressure at the population level is of utmost importance in the assessment of health status, particularly in the detection of cardiovascular diseases, as opined by Boyce et al. (1978). This study, attempted at population level, is aimed to understand the association between blood pressure and body mass index and skinfold thickness and its implications for health of the population.

MATERIAL AND METHODS

150 unrelated healthy female subjects aged 20-59 years were selected randomly from the villages of Thondamanadu, S.N. Kandriga and Ammapalem in Chittor District of Andhra Pradesh State. All the subjects belong to the same socio-economic category with an annual income of about Rs. 25, 000/=. They earn their livelihood by working as wage labourers. Their staple diet includes paddy, red gram, vegetables, greens and milk products. These are observed to be consumed by the people in proper proportions.

Following the techniques recommended by Singh and Bhasin (1989), height and weight were recorded in centimeters and kilograms, respectively. From these body mass index was calculated using the formula, weight/ height^2 x 100, following the procedure of Garrow (1985). Skinfold thickness which indicates the fat or adipose tissue is a measure of reserve energy. This was measured at the biceps and triceps muscles on the left arm of the subject using Harpenden skinfold caliper. The biceps skinfold measure was taken directly at the biceps point on the front of the upper arm. The triceps skinfold was measured by picking

the skin at the midpoint on the back of the upper arm over the triceps muscle.

Blood pressure was measured at the study place with a random-zero mudler sphygmomanometer (Hawsky, UK) as per the procedure of Rose et al. (1982). The systolic blood pressure was measured three times at 5 minutes intervals. The diastolic blood pressure was recorded at the fifth phase of Karatkoff sounds. The average of the second and third systolic and diastolic pressures only was used as the mean blood pressure, ignoring the first measure due to the expected pressure effect. The values are expressed in mm Hg. Descriptive statistics, correlation coefficient and χ^2 tests have been applied for the analysis of the data.

The data, though based on a small sample, have been preferred to be treated according to the five-year rather than the 10-year age classes due to the absence of variation between their individual results obtained, when the data were subjected to analysis separately by these age classes. The results are furnished in tables 1 to 5 and a graph.

RESULTS AND DISCUSSION

The values of mean systolic and diastolic blood pressure and of anthropometric measurements by age classes are shown in table1. The mean height values do not show appreciable change within the age groups. The values of mean weight, body mass index and fat fold thickness present increasing trends, barring some fluctuations in the 20-24 to 45-49 year age groups and then show a decreasing trend. On the other hand, the systolic and diastolic blood pressure values show increasing trends with the increasing age.

The goodness of fit between systolic and diastolic blood pressure and age tested with χ^2 (Tables 2 and 3) show statistically significant association. Further there is significant positive association observed between blood pressure and body mass indices as indicated by correlation values (Table 4). The mean systolic and diastolic blood pressure by skinfold thickness (triceps) plotted on graph (Fig.1) reveal no striking differences in them when the triceps skinfold thickness remained at 12.9 mm (101/68). However, further increase in this

Table 1: Values of mean± S.D. of anthropometric measurements and blood pressure by age groups

Age group	*N*	*Height cm*	*Weight kg*	*Body mass index*	*Biceps mm*	*Triceps mm*	*Systolic blood Pressure mm Hg*	*Diastolic blood pressure mm Hg*
20-24	42	152.86	48.19	20.92	3.52	12.24	106.76	63.69
		±6.32	±6.25	±3.11	±1.25	±2.85	±7.33	±8.41
25-29	27	153.57	54.44	22.85	2.89	12.29	108.67	63.07
		±4.65	±7.01	±3.40	±0.87	±3.53	±9.86	±8.79
30-34	17	152.62	51.53	22.08	3.00	12.71	108.00	65.76
		±4.84	±11.41	±4.42	±1.14	±3.74	±10.76	±10.78
35-39	11	149.26	55.82	25.08	2.73	13.64	109.82	66.82
		±5.31	±11.19	±3.68	±1.14	±2.60	±14.93	±12.45
40-44	13	151.68	57.31	24.89	3.31	14.08	112.46	67.69
		±5.38	±11.34	±4.57	±1.20	±4.10	±9.12	±9.82
45-49	6	152.56	60.33	26.04	3.33	14.33	116.33	73.33
		±5.37	±10.66	±3.62	±1.25	±3.73	±14.49	±15.82
50-54	17	150.38	52.47	23.73	2.65	12.47	119.06	69.65
		±4.11	±9.56	±4.21	±1.03	±4.67	±14.71	±11.48
55-59	17	152.12	53.09	22.80	2.94	10.29	132.00	74.00
		±5.90	±12.15	±4.20	±1.09	±4.08	±18.94	±15.28

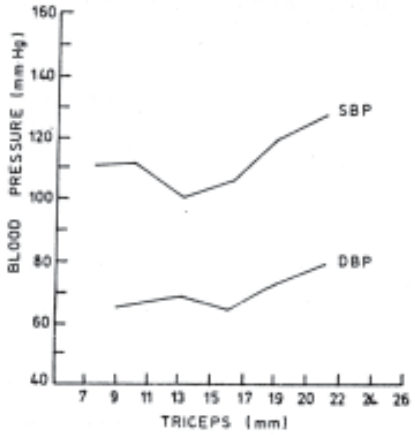

Fig. 1. Mean systolic and diastolic blood pressure by skinfold thickness

measurement caused significant rise both in systolic and diastolic blood pressure.

Table 2: Chi-square values of systolic blood pressure

Age group	*Systolic blood pressure*			
	90	*90-120*	*121-140*	*141-160*
20-24	1.1200	2.4298	6.7200	1.6800
25-29	0.3600	0.3586	0.4033	1.0800
30-34	3.2000	0.0102	0.1959	0.6800
35-39	4.9500	0.3157	0.8736	0.4400
40-44	0.1733	0.0584	3.0769	0.5200
45-49	0.0800	0.1098	1.1267	0.2400
50-54	0.2270	0.1403	0.6023	0.1503
55-59	0.2270	5.2398	6.7347	27.4450
Total	10.3373	8.6626	19.7334	32.2353

*P<.05 = 70.9686 *Significant

Table 3: Chi-square values of diastolic blood pressure

Age group	*Diastolic blood pressure*			
	60	*60-90*	*91-100*	*100*
20-24	0.860	0.130	0.560	0.560
25-29	0.230	0.120	0.350	0.350
30-34	0.460	0.290	0.227	0.227
35-39	0.450	0.090	0.147	0.147
40-44	0.111	0.008	0.173	0.173
45-49	0.370	0.990	8.846	8.850
50-54	0.460	0.063	2.632	0.227
55-59	1.330	0.289	0.227	2.632
Total	4.271	1.980	13.162	13.166

*P<.05 =32.579 *Significant

Table 4: Correlation between body mass indices and blood pressure

Bodymass indices	*Systolic blood pressure*	*Diastolic blood pressure*
<20	0.566	0.291
20-24.9	0.521	0.627
25-29.9	0.485	0.404
>30	0.382	0.268

Following the classification proposed by Kaplan (1978), the incidence of cases has been separated into three categories : hypertensives with systolic blood pressure (SBP) of >160mm Hg and diastolic blood pressure (DBP) of >95mm Hg, borderline cases whose SBP and DBP values lie between 141 and 159mm Hg and 91-95mm Hg, and normotensives whose SBP and DBP values are <140mm Hg and <90mm Hg, respectively (Table 5). It is observable that the values of biceps SF and blood pressure are low in these subjects. However they lie within the range as compared to other published results. The independent values of both systolic and diastolic blood pressure are comparatively low in these populations and not showing any significant deviation with high extremities. Hence the percentage of normotensives is found to be higher in the present series.

Variation in the blood pressure levels is apparent as age advances. This variation trends to be lower in the household samples than that

of hospital, possibly due to the former situation being a natural setting, which helped the respondents to be relatively free from anxiety

Table 5: Incidence of normotensive, border line and hypertensive cases by systolic (S.B.P.) and diastolic blood pressure (D.B.P.)

Category	S.B.P		D.B.P.	
	N	%	N	%
Normotensive	144	96	146	97.3
Borderline cases	3	2	0	0
Hypertensives	3	2	4	2.7

and emotions. Similar finding has been reported in some earlier investigated populations too (Reddy et al., 1990). Blood pressure, as a multifactoral dependent, may tend to be lower in subjects in a normal emotion and stress-free residential atmosphere than when they are exposed to a clinical situation, which makes the subject a psychologically different one. Higher body mass index in the sample ranging between 20-24 and 45-49 year age groups may be attributed to the physical activities carried out by the subjects in the form of domestic chores and agricultural labour. Higher levels of systolic and diastolic blood pressure which cause hypertension or stroke may be the consequence of obesity or overweight, like other categories such as low or normal nutrition, as can be judged from the body mass indices. Higher skinfold thickness as accumulated triceps fat has shown a reading of over 13mm in about one-third of the sample, causing higher levels of both systolic and diastolic blood pressure. This very same proportion of the sample is affected by overweight too inflating the levels of blood pressure. Thus, our study clearly demonstrates that overweight as well as higher skinfold fat can cause higher levels of both systolic and diastolic blood pressure.

Though the negligible proportion of hypertensive subjects as compared to a very high proportion of normotensives makes it a disturbing finding, the factor of increased triceps skinfold thickness causing significant increase in blood pressure and in turn indicating risk involvement to the subjects, makes it all the more interesting a result and can not be brushed aside. These factors in turn depend on the nutrition of the individual and this trend has to be explained in terms of the likely stress. Ultimately to understand blood pressure as an outstanding marker of human health, it is quite necessary to go into the various aspects of the diet of the people.

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An Appraisal of the Nutritional Status of Jatapu School Boys of Vizianagaram District, Andhra Pradesh, India

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KEY WORDS Nutritional Status. Jatapu School Boys. Andhra Pradesh.

ABSTRACT The study of nutritional status undertaken on 358 Jatapu school boys in the age group of 5-15 years showed that the boys were malnourished by height, weight, arm circumference, and triceps skin fold measurements. The percentage malnourished and the degree of malnutrition varied from one parameter to the other indicating the effects of short and long duration malnutrition on these parameters. The children were observed to be benefited by the feeding programme at the schools, without which the degree of malnutrition would have been severe.

The pattern of growth and the physical state of the body though genetically determined, are profoundly influenced by diet and nutrition. Other factors such as frequent illness due to infection or infestation by parasites may also affect the growth. With better nutrition, a child will grow normally: Malnutrition will influence growth especially in the periods of peak velocity. The existence of widespread malnutrition among the poor children and women in the reproductive period has been established (Shukla, 1982). The rural and tribal populations also form the vulnerable groups.

The present study is an attempt to evaluate the nutritional status of Jatapu school boys of Vizianagaram district, Andhra Pradesh. Majority of the boys are inmates of residential or Ashram schools run by Integrated Tribal Development Agency, Government of Andhra Pradesh.

MATERIAL AND METHODS

The study sample comprises of 358 Jatapu boys in the age group of 5-15 years, mostly inmates of Ashram and residential schools (A small sample of 34 *i.e.* 9.5 per cent is drawn from Samithi Schools) of Bhadragiri mandal, Vizianagaram district, Andhra Pradesh. The location wise and age wise distribution of the sample is presented in table 1.

Table 1: Distribution of Jatapu school boys aged 5-15 years (N = 358)

S. No.	A. Location-wise distribution		B. Age-wise distribution		
	Locality*	N	Age(in years)	N	%
1.	Bhadragiri (R)	141	5+	11	3.1
2.	G.L.Puram (H)	82	6+	26	7.3
3.	Tadikonda (A)	36	7+	29	8.1
4.	Kedaripuram (A)	29	8+	34	9.5
5.	Tikkabai (A)	22	9+	32	8.9
6.	Manda (S)	20	10+	39	10.9
7.	Lakkaguda (S)	14	11+	34	9.5
8.	J.K.Padu colony (H)	14	12+	43	12.0
			13+	49	13.7
*R = Residential, A = Ashram			14+	30	8.4
H = Hostel, S = Samithi			15+	31	8.6

The anthropometric data was obtained using the standard techniques as suggested by Singh and Bhasin (1989). In the present study, four measurements namely height, weight, mid-arm circumference and triceps skinfold were used to evaluate the nutritional status.

The well-nourished Indian school children data reported by Vijayaraghavan et al. (1971, 1974) was used for comparison of the present data. The height for age, weight for age, arm circumference for age and triceps skinfold for age was estimated.

RESULTS AND DISCUSSION

The results of the present study are presented in tables 2 to 5.

Height for Age

The distribution of the boys according to the height for age classification shows that those who have just crossed the preschool age were malnourished *i.e.* a higher per cent of boys were in Grade II and III malnutrition. The boys in the age groups between 7 to 9 years were normal and again from 10 years onwards a decline was observed in the frequency of normal boys. Subsequently, there has been an increase in the incidence of Grade I malnutrition in above 10 years age group. This clearly indicates that during the dormant period of 7-9 years, the velocity of growth is stationary and hence there is less pressure on the body reserves, so the boys were healthy and normal.

Table 2: Distribution of school boys aged 5-15 years according to height for age

		Height for Age		
Age (in years)	*Normal (>95%)*	*Grade-I (90-95%)*	*Grade-II (85-90%)*	*Grade-III (<85%)*
5+	—	27.2	36.4	36.4
6+	19.2	53.8	15.4	11.5
7+	65.5	27.6	6.9	—
8+	79.4	14.7	5.9	—
9+	68.7	25.0	6.2	—
10+	51.3	48.7	—	—
11+	52.9	26.5	20.6	—
12+	32.5	32.5	30.2	4.6
13+	44.9	30.6	16.3	8.2
14+	43.3	40.0	10.0	6.7
15+	35.5	54.8	9.7	—

Table 3: Distribution of school boys aged 5-15 years according to weight for age

		Weight for age		
Age (in years)	*Normal (>90%)*	*Grade-I (75-90%)*	*Grade-II (60-75%)*	*Grade-III (<60%)*
5+	—	27.2	63.6	9.1
6+	7.7	61.5	26.9	3.8
7+	34.5	44.8	20.7	—
8+	61.8	29.4	8.8	—
9+	56.2	25.0	18.7	—
10+	48.7	38.5	12.8	—
11+	41.2	32.3	26.5	—
12+	20.9	41.9	37.2	—
13+	34.7	36.7	24.5	4.1
14+	46.7	36.7	10.0	6.7
15+	51.6	32.2	16.1	—

Weight for Age

Similar trend as in height for age was observed for this parameter also. The boys of 5+years were more in Grade II malnutrition, while the 6 years old boys were more in Grade I malnutrition and thus a shift in the grades towards normal with the increasing age upto 9th years and again a shift towards Grade I from 10 years onwards till 13th year and then a increase, was noticed. The beneficial effect of feeding at schools can also be observed in this pattern of malnutrition. Thus, an improvement is observed compared to the pre-school age when the boys were on home diet.

Arm Circumference for Age

However, in the case of arm circumference for age, it is observed that a higher per cent of 5 years old boys are in Grade II malnutrition while boys of all other age groups till the 13th year are in Grade I malnutrition and above 13 years boys are in normal grade. The younger age group boys according to this classification are worse than by their height or weight categories. The older age groups also confirm to the same trend. It is understandable that the mid-arm circumference being sensitive to malnutrition rather than, height or weight, the younger age groups boys were observed to be more malnourished by this category indicating that they are not all that normal as indicated by height and weight. However, the measurement in the higher age group does indicate the same trend in comparison to weight, showing that the height of the boys is most affected during the growth spurt because of malnutrition.

Table 4: Distribution of school boys aged 5-15 years according to arm circumference for age

		Arm circumference for age		
Age (in years)	*Normal (>95%)*	*Grade-I (85-95%)*	*Grade-II (75-85%)*	*Grade-III (<75%)*
5+	—	18.5	81.8	—
6+	3.8	46.1	38.5	11.5
7+	10.3	51.7	37.9	—
8+	35.3	52.9	11.8	—
9+	40.6	40.6	18.7	—
10+	28.2	56.4	15.4	—
11+	26.5	52.9	20.6	—
12+	23.2	41.9	34.9	—
13+	40.8	38.8	16.3	4.1
14+	50.0	36.7	13.3	—
15+	58.1	22.6	19.3	—

Table 5: Distribution of school boys aged 5-15 years according to triceps skinfold for age

		Triceps skinfold for age		
Age (in years)	*Normal (>95%)*	*Grade-I (85-95%)*	*Grade-II (75-85%)*	*Grade-III (<75%)*
5+	18.2	9.1	18.2	54.5
6+	—	7.7	7.7	84.6
7+	—	—	17.2	82.7
8+	—	11.8	2.9	85.3
9+	—	6.2	6.2	87.5
10+	2.6	7.7	7.7	82.1
11+	5.9	2.9	5.9	85.3
12+	2.3	7.0	11.6	79.1
13+	4.1	4.1	10.2	81.6
14+	3.3	3.3	10.0	83.3
15+	6.4	3.2	16.1	74 2

Triceps Skinfold for Age

The triceps skinfold of the boys was observed to be less in all age groups indicating a majority of boys to be in Grade III malnutrition, except at 5 years age when the boys were observed to be in Grade II malnutrition. Since by all other parameters, a marginal to moderate degree of malnutrition is observed, the boys may not be expcted to have higher fat fold. Since their food and subsistence pattern shows that their day to day body needs are only met, any high deposits of body fat and muscles cannot be expected. Considering the variation in the incidence of malnutrition from one age group to another, the tendency of fat fold to vary regardless of any pertinent factor has to be accounted for.

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Distribution of ABO Blood Groups Among Some Populations of North Bihar

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KEY WORDS Blood Groups. Population Study. North Bihar.

ABSTRACT The distribution of the ABO blood groups has been studied among 15 populations of North Bihar *viz.*, Bania, Bengali, Bhumihar, Brahmin, Chamar, Dusadh, Kayastha, Kurmi, Mushar, Muslim, Rajput, Yadav, Mallah, Oraon and Kharwar. There was preponderance of group B over group A in most of them, while Brahmin, Mushar, Mallah and Oraon showed preponderance of group A over group B. It was concluded that there is no correlation between ethnic relationship and serological similarity in the present material from Bihar.

INTRODUCTION

Blood groups are useful genetic markers in recognising the racial composition of investigated communities (Gupta, 1974). Their frequency in a population, although a very stable characteristic, is affected by geographical isolation, temporal variation and genetic drift (Sharma, 1985; Bittles and Smith, 1991; Das, 1992; Pandey et al., 1993b). In view of the importance of blood groups in ecological adaptation, diseases and population characteristics, the present study, which deals with the distribution of the ABO blood groups in various populations of North Bihar, was undertaken.

MATERIAL AND METHODS

For the present work the populations selected were Bania, Bengali, Bhumihar, Brahmin, Chamar, Dusadh, Kayastha, Kurmi, Mushar, Muslim, Rajput, Yadav, Mallah, Oraon and Kharwar. Blood samples were collected from Purnia, Dharhara, Kasba, K. Nagar, Milki, Harda, Ishipur, Murli Chanerkhoda, Araria and Kishanganj areas of North Bihar. Blood groups were determined by slide agglutination method using anti-A and anti-B sera. The ABO allele frequencies were calculated according to Mourant et al. (1976).

RESULT AND DISCUSSION

Results are presented in table 1. Barring Brahmin, Mushar, Mallah and Oraon, in remaining 11 population groups surveyed, the incidence of group B was higher than that of group A (Table 1). Relatively higher frequency of group B than A in the ABO system is observed in majority of Indian populations and the people of Gangetic plains are no exception (Bhasin et al., 1992, 1994). Higher frequencies of blood group B have been reported among Bania, Rajput and Yadav of Uttar Pradesh by Mandal (1992). Singh and Sinha (1988) have also reported higher incidence of group B among Dusadh and Mushar of Bhagalpur. Thus the results of the present investigation are in conformity with earlier reports from the state.

In the present investigation Brahmin, Mallah, and Oraon show high frequency of A group. Likewise, B group is prevalent among Bhumihar (forward caste). Bania and Kurmi (backward class) and Chamar and Dusadh (scheduled caste). Rajput and Kayastha (a forward caste), Yadav (backward class) and Mushar (scheduled caste) manifest high frequency of O group. Thus it can be concluded that there is no apparent correlation between ethnic relationship and serological similarity in North Bihar. Similar observations were made earlier by Lundman (1948), Rao (1977) and Pandey et al. (1993b).

Kharwar and Oraon are scheduled tribes. Both have migrated from Chotanagpur plateau.

Table 1: Distribution of the ABO blood groups in the North Bihar populations

S. No.	Population	N	Phenotype Frequency				Allele Frequency		
			O	*A*	*B*	*AB*	*O*	*A*	*B*
1.	Bania	190	56 (29.47)	36 (18.95)	70 (36.84)	28 (14.74)	0.52	0.18	0.30
2.	Bengali	210	82 (39.05)	45 (21.43)	68 (32.38)	15 (7.14)	0.62	0.16	0.22
3.	Bhumihar	209	71 (33.97)	42 (20.10)	78 (37.32)	18 (8.61)	0.58	0.16	0.26
4.	Brahmin	208	67 (32.21)	72 (34.62)	54 (25.96)	15 (7.21)	0.58	0.24	0.18
5.	Chamar	368	123 (33.42)	80 (21.74)	150 (40.76)	15 (4.08)	0.60	0.14	0.26
6.	Dusadh	222	64 (28.83)	57 (25.68)	79 (35.59)	22 (9.91)	0.54	0.20	0.26
7.	Kayastha	228	90 (39.47)	52 (22.81)	58 (25.44)	28 (12.28)	0.60	0.20	0.20
8.	Kurmi	298	101 (33.89)	40 (13.42)	136 (45.63)	121 (7.29)	0.58	0.11	0.31
9.	Mushar	325	106 (32.62)	103 (31.69)	81 (24.92)	35 (10.77)	0.56	0.24	0.20
10.	Muslim	304	142 (46.71)	50 (16.45)	82 (26.97)	30 (9.87)	0.66	0.14	0.20
11.	Rajput	282	105 (37.23)	60 (21.28)	98 (34.75)	19 (6.74)	0.61	0.15	0.24
12.	Yadav	247	96 (38.87)	50 (20.24)	79 (31.98)	22 (8.91)	0.61	0.16	0.23
13.	Mallah	179	52 (29.05)	63 (35.20)	45 (25.14)	19 (10.61)	0.54	0.26	0.20
14.	Oraon	117	28 (23.93)	52 (44.44)	26 (22.22)	11 (9.40)	0.50	0.32	0.18
15.	Kharwar	171	18 (10.52)	36 (21.05)	108 (63.15)	9 (5.26)	0.39	0.15	0.45

The present Kharwar show highest frequency of group B, as has also been reported in Kharwar of Ranchi (Sarkar, 1949; Kumar, 1970). If the dispersal distances are very short, the mates born are close to each other (Smith, 1989). The distance of Bhagalpur from Ranchi being nearly 200 km, the similarity in blood groups of Kharwar of Ranchi and Bhagalpur may be due to short dispersal distance. Further, Race and Sanger (1958) has also reported that isolated migrants retained the ABO distribution of their place of origin for several centuries rather than conforming to that of surrounding population. On the other hand, in the present investigation the Oraon of Purnia exhibited highest frequency of group A, while group B has been reported highest among the Oraon of Ranchi. It means in the changed ecological condition group A favours these migrants to adapt ecologically (Pandey et al., 1993a).

The frequency of the *O* allele was over 50% in all populations (except Kharwar) being high in Muslim (65%) (Table 1). The *A* allele frequency was recorded high among Oraon and low among Kurmi. The *B* allele was found most preponderant among Kharwar and least preponderant among Oraon. Such differences in ABO allele frequencies recorded earlier also in other

population groups of Bihar (Pandey et al., 1993a,b) indicate biological distinctions of different groups in local population of the state.

Sarkar (1954) observed that a higher frequency of *A* allele is characteristic of Australoids *i.e. A* greater than *B* with moderately high *O* is a pre-Dravidian pattern. However it is difficult to draw any conclusions regarding the ethnic origins of the present populations of North Bihar based on a single genetic marker. Further, investigations utilising serological as well as biochemical markers are therefore required to establish genetic constitution and ethnic affiliations of contemporary human populations inhabiting this region.

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