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Growth Profile of Baiga Children – A Primitive Tribe of District Dindori of Madhya Pradesh, India

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A B S T R A C T

The present study has been carried out on 795 Baiga children (453 males and 342 females) of Baiga-chak area of Dindori district in Madhya Pradesh (MP) varying between 1–18 years of age with an aim to understand their growth profile using cross sectional design. Fourteen body measurements (weight, height, sitting height, lengths, breadths, circumferences and skin folds) were studied. Four indices namely Sitting height / Leg length, Bicristal breadth / Biacromial breadth, Head circumference / Chest circumference & Cephalic index were computed to study the proportionate body changes. All body measurements except for skin folds increased progressively in each age group showing insignificant difference between boys and girls in most of age groups with no evident peak velocity during pubertal age in both sexes. However skin folds showed inconsistent pattern with each successive age. The present children were slightly heavier and taller than tribal children of other areas but lighter and shorter than Bharia children[32]. However, these children were comparable with all India rural children[20] but found below 10th percentile when compared with National Centre for Health Statistics (NCHS) standards[38]. The absence of peak velocity and poor growth in studied children may be due to low intensity of growth rate. Proportionate changes observed in the present study were similar to Indian Punjabi girls[44].

***Key words**: growth profile, children, tribe*

Introduction

Anthropometry constitutes the means by which differences in the body forms and proportions can be brought to light. These differences can be better interpreted through proper understanding of growth pattern and differential growth rate of the children. The accurate knowledge of growth and development helps to understand and monitor the morbidity pattern and nutritional status of an individual and of the community. Growth studies are also helpful either for improving the health condition of human population or for administering any health intervention programme.

Indian population is broadly grouped into three clusters namely, urban, rural and tribal. People of these communities are living under different environmental conditions, having different dietary habits and are belonging to different ethnic groups. They present interesting morphological differences and variations in body forms and proportions. However, most of the growth studies in these directions were either carried out in India among urban population[1–16] or in rural population[15–25]. Sporadic attempt had been made recently to understand growth variations including health and morbidity pattern of tribal children inclusive of primitive tribes[26–34]. Even though the tribal population constitutes 8.2% of total Indian population and Madhya Pradesh has highest number of tribal population compared to other parts of the country comprising 20.3% of total Indian tribal population[35]. Further, the tribals particularly the primitive tribes, dwell in hard core and inaccessible areas. Obviously the need to quantify and understand growth variations is relatively more imperative for primitive tribal communities.

Baigas were identified as one of the primitive and dwindling tribe during fifth five year plan on account of their (i) primitive and pre-agricultural technology, (ii) low literacy and (iii) diminishing and stagnant population. Baiga economy is still dependent upon primitive agriculture, hunting and gleaning. With this view in mind, the present study was carried out on Baigas of Baigachak area of Dindori district. This study has been delved with an aim to understand the growth profile of one to eigh-

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teen years old Baiga children of both sexes and to compare the same with similar available studies.

Subjects and Methods

The Baigas of MP are predominantly inhabited in 1143 villages of Mandla, Shahdol, Anuppur, Balaghat, Dindori & Umaria districts (Source 1992–93, Tribal Sub Plan, Government of MP)[36]. Dindori district was identified for the present study. Baigas of Baiga Chak area of this district is relatively more primitive and dwell in three blocks in higher preponderance namely Karanjia, Samnapur and Bajag. Further they inhabit themselves in extreme isolation and in forest covered by hilly track. Figure 1 shows the map of Dindori district and study area. The prospective cross sectional study to observe the growth and development of Baiga children has been carried out in 25 villages. These villages were selected from the three blocks using clustering method in such a way that samples become representable for the entire area and villages can be approachable throughout the year. The consent of the parents and community leaders were sought after explaining the purpose of the study. After obtaining the informed consent, 795 apparently healthy Baiga children of both sexes varying between 1–18 years of age amidst the community were selected to achieve the proposed aim. Date of birth of each child was ascertained after preparing own calendar with the help of local events, festivals and incidents. Only healthy children, free from any apparent disease were included in the study. None of the selected children were on medication. The sick children and whose age could not be ascertained were excluded from the study.

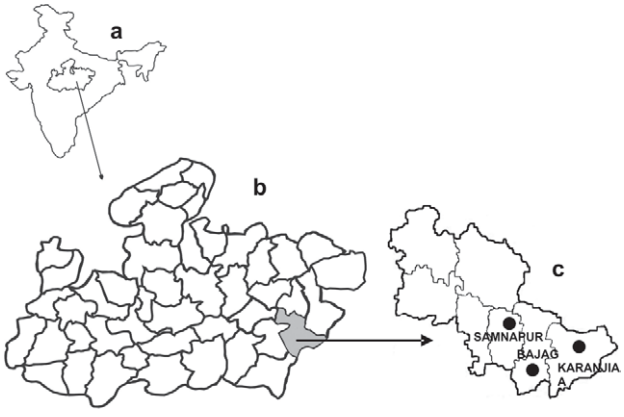

Fig. 1. a) Map showing India. b) State Madhya Pradesh. c) Study area of Dindori district.

The present study was based on cross-sectional sample of 795 Baiga boys and girls. Fourteen anthropometric measurements via Weight, Height, Sitting height, Leg and Head length, breadths of Head, Chest, Biacromial and Bicristal, circumferences of Head, Arm, Chest; Biceps and Triceps skin fold were taken using standard techniques, methodologies and landmarks[37]. Breadths of chest, biacromial and bicristal, sitting height and leg length were measured only in those children who were above two years of age and can stand erect. All measurements were taken by a team consisting of four trained and qualified anthropologists for anthropometry. Data was collected from January 1989 to May 1989. Four indices (Sitting height / Leg length, Bicristal breadth / Biacromial breadth, Head circumference / Chest circumference & Cephalic index) were computed to understand the relative bodily changes of these children. Data was entered in Microsoft Access and data validation and cleaning were done routinely during data entry. The analysis was performed in SPSS 17 for Windows (Chicago, IL). Growth curves were constructed to observe growth rate and pattern visually.

Results

Observations made on 795 Baiga children (453 boys and 342 girls) are presented in two parts. First part deals with growth pattern and growth rate of Baiga children and second part deals with proportionate changes. Mean values and increments of fourteen body measurements are given in Table 1 and 2 respectively. Graphical presentation of growth of weight, height, head length, triceps skin fold, biacromial breadth, bicristal breadth, chest and arm circumference are illustrated in Figure 2 and 3. The proportionate changes observed through indices in each successive age are shown in Figure 4.

Pattern and rate of growth of Baiga children

The mean values of all the measurements increased steadily from age 1 to 18 years in both sexes except for skin folds. Highest increment in weight was found between 15–16 years of age in boys (5.9 kg) and between 12–13 years of age in girls (5.8 kg). The mean weight between boys and girls was not found to differ significantly except between 7–8 ($t=2.65$; $p<0.01$) and 16–17 ($t=3.39$; $p<0.005$) years of age. Figure 2A showed more or less steady weight gain up to 8 years in both sexes thereafter, growth rate accelerated gradually and was maximum between 12–13 years of age in both sexes with no clear-cut peak weight spurt. Considerable variations were noted intermittently between the ages. The maximum increase *per* year in body height for boys (13.2 cm) and girls (11.1 cm) was observed between 2–3 years in both sexes. Mean value at each age indicates that boys were insignificantly taller than the girls almost in each age group. More variation in girls than the boys with no evident peak height spurt either in boys or in girls was evident through Figure 2B.

Like body height, sitting height also showed gradual growth rate in both sexes showing considerable variations in the growth rate. However it was more in girls. The increase in sitting height was highest (3.7 cm) between 8–9 years of age in boys. In girls, it was highest (5.3 cm) between 12–13 years of age. The mean values of leg length indicated higher sex difference than sitting

TABLE 1
MEAN AND STANDARD DEVIATION OF ANTHROPOMETRIC MEASUREMENTS OF BAIGA BOYS

Age (yrs)	N	Weight (kg)	Height (cm)	St. Height	Lengths (cm)		Breadths (cm)				Circumferences (cm)			Skinfolds (mm)	
					Leg	Head	Head	Chest	Biacro-mial	Bicristal	Head	chest	Arm	Biceps	Triceps
		$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD
1+	29	7.4±1.7	67.9±6.6	–	–	15.9±0.8	9.4±0.9	–	–	–	43.6±3.3	43.8±2.9	12.6±1.1	5.0±1.5	7.5±2.0
2+	35	9.3±2.2	81.1±6.0	48.7±2.2	45.1±4.8	16.4±1.6	9.4±0.6	14.9±0.7	18.8±2.3	14.7±1.3	47.0±2.2	49.1±2.9	12.7±1.7	4.9±1.2	7.3±2.0
3+	39	11.4±1.5	89.8±7.4	50.8±2.2	48.8±2.9	16.7±0.9	9.3±0.6	15.5±1.1	20.9±2.4	15.7±1.1	47.5±2.0	55.0±2.0	12.9±0.9	4.5±1.3	7.1±2.0
4+	35	13.2±1.8	97.0±9.1	53.9±2.9	52.8±5.6	17.1±0.7	9.6±0.8	16.3±1.2	20.7±1.9	16.6±1.3	48.5±1.4	51.9±3.2	13.4±0.9	4.4±1.7	6.1±1.7
5+	36	14.8±3.6	106.0±9.5	56.7±3.9	57.6±5.5	17.3±0.6	9.9±1.3	17.3±1.1	22.9±1.7	17.5±1.2	49.7±2.2	53.9±3.1	14.1±1.3	3.4±0.8	5.2±1.3
6+	33	16.3±2.4	108.6±7.9	56.1±3.5	61.1±6.2	17.4±0.8	9.8±0.5	17.4±1.0	23.1±1.6	17.9±1.2	49.3±1.9	55.3±1.2	13.7±2.0	3.2±0.5	5.1±0.9
7+	40	18.4±1.9	115.1±4.8	59.5±2.4	62.1±6.1	17.7±0.5	10.4±0.6	18.1±1.2	24.0±1.4	18.8±1.3	50.5±1.9	56.9±3.4	14.3±0.8	3.4±0.7	5.4±1.2
8+	34	21.9±4.5	120.3±5.9	63.2±3.9	70.6±7.9	17.7±0.4	10.2±0.5	19.1±1.3	25.5±1.5	19.7±1.6	50.7±1.5	59.8±3.8	15.4±1.2	3.0±0.7	4.8±1.1
9+	22	22.4±2.4	125.5±4.7	64.1±2.9	73.8±3.8	17.8±0.9	10.2±0.5	19.3±1.1	25.9±1.4	20.2±1.0	51.5±1.7	61.4±3.4	15.4±1.2	2.9±0.5	4.6±1.0
10+	19	25.2±2.1	132.1±4.4	65.8±3.6	77.9±3.4	18.0±0.5	10.6±0.4	20.1±0.9	27.8±1.9	21.4±1.5	51.2±1.1	64.1±2.3	16.8±1.0	2.9±0.5	4.8±0.8
11+	40	26.3±5.3	134.3±6.5	66.9±3.2	78.8±3.7	–	–	20.3±1.5	27.3±2.0	21.5±1.2	52.2±2.1	65.0±4.4	16.7±1.3	3.3±0.7	5.2±1.0
12+	25	31.6±4.5	140.9±4.5	70.4±2.3	83.7±5.5	–	–	21.4±1.4	28.8±2.7	23.1±1.5	52.5±1.7	66.6±3.9	17.9±1.7	3.1±0.5	5.0±0.9
13+	10	33.8±4.7	146.4±5.7	71.7±4.5	87.6±3.4	–	–	21.7±1.5	30.6±1.8	22.6±1.9	53.5±3.6	70.0±4.6	18.9±2.0	3.3±0.6	5.0±1.2
14+	12	36.5±3.4	149.6±6.7	74.4±2.4	89.5±7.1	–	–	22.9±2.2	30.9±1.5	24.3±1.5	52.2±1.6	70.4±3.6	19.2±1.4	3.3±0.4	5.1±1.2
15+	24	42.3±7.8	153.6±4.5	74.8±2.2	92.5±3.7	–	–	23.8±0.6	32.9±0.8	25.7±0.9	52.9±0.9	75.3±3.6	21.2±1.8	4.4±0.9	7.4±2.1
16+	06	47.9±2.9	158.6±7.1	77.3±2.3	95.2±5.1	–	–	25.3±0.6	35.2±1.0	25.7±0.6	53.5±1.3	77.7±2.6	21.9±1.0	4.4±0.9	5.6±1.1
17+	14	47.8±5.6	155.7±6.4	78.0±4.3	93.4±5.7	–	–	22.8±2.2	33.9±2.4	26.9±3.8	54.5±±.8	76.8±5.3	21.7±2.3	3.7±0.5	6.5±1.1

$\bar{X}$±SD – Mean ± Standard deviation, St – sitting

TABLE 2
MEAN AND STANDARD DEVIATION OF ANTHROPOMETRIC MEASUREMENTS OF BAIGA GIRLS

Age (yrs)	N	Weight (kg)	Height (cm)	St. Height	Lengths (cm)		Breadths (cm)				Circumferences (cm)			Skinfolds (mm)	
					Leg	Head	Head	Chest	Biacro-mial	Bicristal	Head	chest	Arm	Biceps	Triceps
		$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD	$\bar{X}$±SD
1+	27	8.0±1.3	68.7±1.2	–	–	15.4±0.8	8.8±0.5	–	–	–	43.1±2.4	43.6±2.9	12.2±1.2	5.3±1.6	7.5±1.4
2+	27	8.5±1.1	79.8±4.6	47.9±2.6	46.8±3.6	16.2±1.1	9.4±1.1	14.3±0.7	20.3±1.3	15.6±1.3	45.3±2.4	45.9±3.0	12.5±1.0	3.2±1.7	7.9±2.1
3+	33	10.7±1.9	87.9±9.5	50.2±3.4	48.3±5.1	16.6±0.5	9.6±0.6	15.2±1.1	19.9±1.7	15.5±1.0	46.5±1.7	48.7±3.0	13.1±0.9	5.0±1.9	8.3±3.0
4+	24	12.4±2.7	93.8±7.7	51.9±3.1	49.9±5.8	16.8±0.8	9.5±1.0	15.3±1.9	20.9±2.3	16.6±1.5	47.0±1.4	49.8±1.7	13.0±0.8	3.9±0.9	6.4±1.3
5+	23	14.6±2.5	102.1±5.2	55.0±3.5	55.6±4.8	17.0±0.6	9.9±0.7	16.3±1.7	23.0±1.3	17.6±1.5	49.0±2.7	53.4±3.1	13.5±1.2	4.4±1.2	5.8±0.9
6+	26	16.0±1.7	108.1±3.3	57.5±2.4	61.5±4.7	17.2±0.7	9.5±0.4	17.1±0.7	23.4±1.0	17.7±1.1	49.2±1.1	54.3±1.9	14.2±0.7	3.1±0.8	5.7±1.8
7+	24	17.1±1.9	111.5±6.9	58.6±3.1	63.3±6.9	17.3±0.8	9.6±0.8	17.2±1.0	23.4±1.6	18.0±1.2	49.2±1.8	53.9±2.5	14.3±0.7	3.6±0.9	5.7±1.3
8+	27	21.8±4.1	120.7±7.4	62.8±4.2	71.7±6.0	16.9±1.5	10.1±0.4	18.4±1.2	24.9±1.8	19.4±1.9	51.5±2.8	57.2±2.6	15.8±1.8	3.5±1.3	6.1±1.7
9+	18	20.6±1.7	123.1±3.6	60.8±4.5	72.1±1.9	17.7±0.5	10.2±0.3	18.0±1.1	26.5±1.0	19.3±2.0	51.2±2.8	58.7±1.9	15.9±0.6	2.9±0.6	4.7±0.9
10+	16	23.2±2.3	128.1±4.6	65.7±1.4	75.8±3.9	17.5±0.9	10.4±0.5	19.9±0.4	26.5±1.4	20.8±0.8	51.1±1.6	61.0±3.4	16.1±1.2	3.1±0.3	4.8±0.6
11+	27	25.7±2.6	132.0±6.6	66.3±3.6	78.0±6.0	–	–	19.9±1.4	26.2±1.9	21.6±1.0	51.3±0.8	61.9±2.4	16.6±0.9	3.2±0.6	7.7±1.7
12+	15	31.5±3.4	140.3±3.1	71.6±2.4	82.9±2.6	–	–	21.8±1.8	28.9±2.1	23.1±1.5	52.3±1.2	68.3±5.7	19.8±2.2	4.5±1.3	7.2±2.2
13+	09	35.6±6.8	143.9±8.5	72.2±3.8	84.6±5.9	–	–	22.1±1.5	29.4±2.0	23.4±1.6	51.8±2.8	68.1±4.8	21.0±3.5	4.3±0.9	6.5±2.4
14+	13	36.2±1.6	146.9±4.9	76.1±1.6	86.9±3.9	–	–	22.9±1.1	31.0±0.7	23.1±0.9	52.8±0.3	71.8±1.7	21.0±1.3	4.2±1.0	6.6±1.7
15+	20	41.4±5.3	152.5±9.6	74.8±2.2	89.4±6.1	–	–	23.5±2.1	31.5±3.3	23.8±2.7	53.8±1.8	75.3±3.6	21.0±2.6	3.7±0.9	5.7±1.7
16+	09	42.5±3.1	152.0±6.9	77.3±3.3	91.8±7.3	–	–	24.7±0.9	33.0±1.1	26.3±2.0	54.2±0.8	77.7±2.7	21.9±0.9	4.3±0.9	5.8±2.6
17+	04	42.5±3.4	152.7±4.7	76.9±3.1	90.5±2.2	–	–	24.2±1.0	31.9±2.4	25.5±1.1	54.6±1.5	74.8±2.5	22.0±1.2	3.5±0.7	7.6±1.5

$\bar{X}$±SD – Mean ± Standard deviation, St – sitting

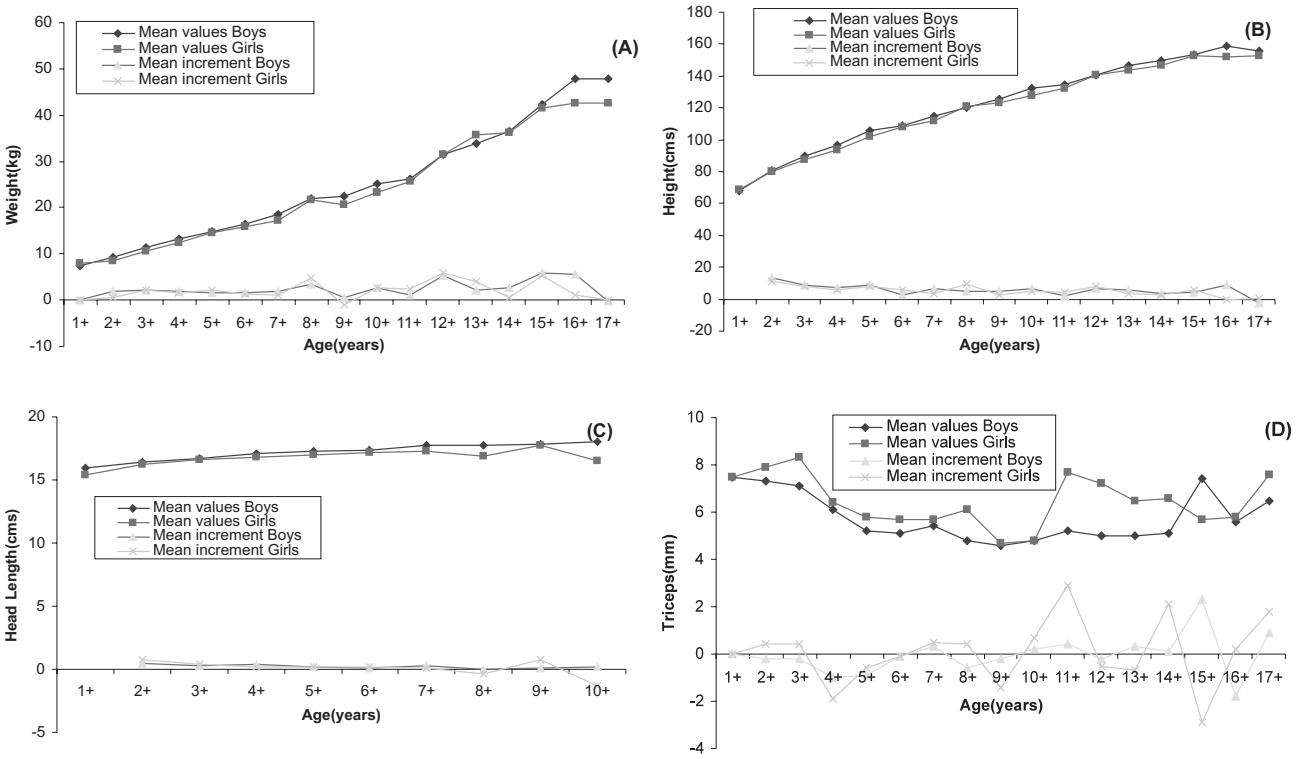

Fig. 2. Graphical Presentation of Mean and Mean increments of weight (A), height (B), head length (C) and triceps (D).

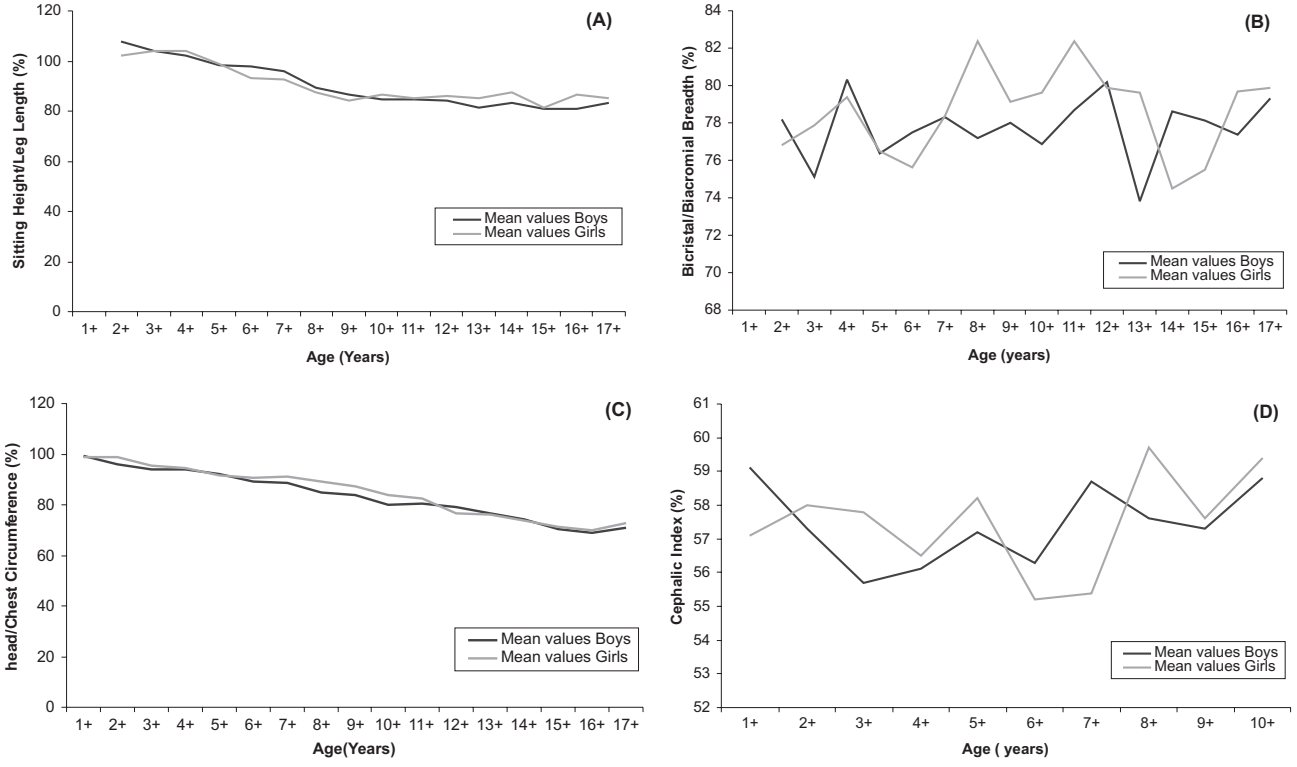

Fig. 3. Graphical Presentation of Mean and Mean increments of biacromial breadth (A), bicristal breadth (B), chest circumference (C) and arm circumference (D).

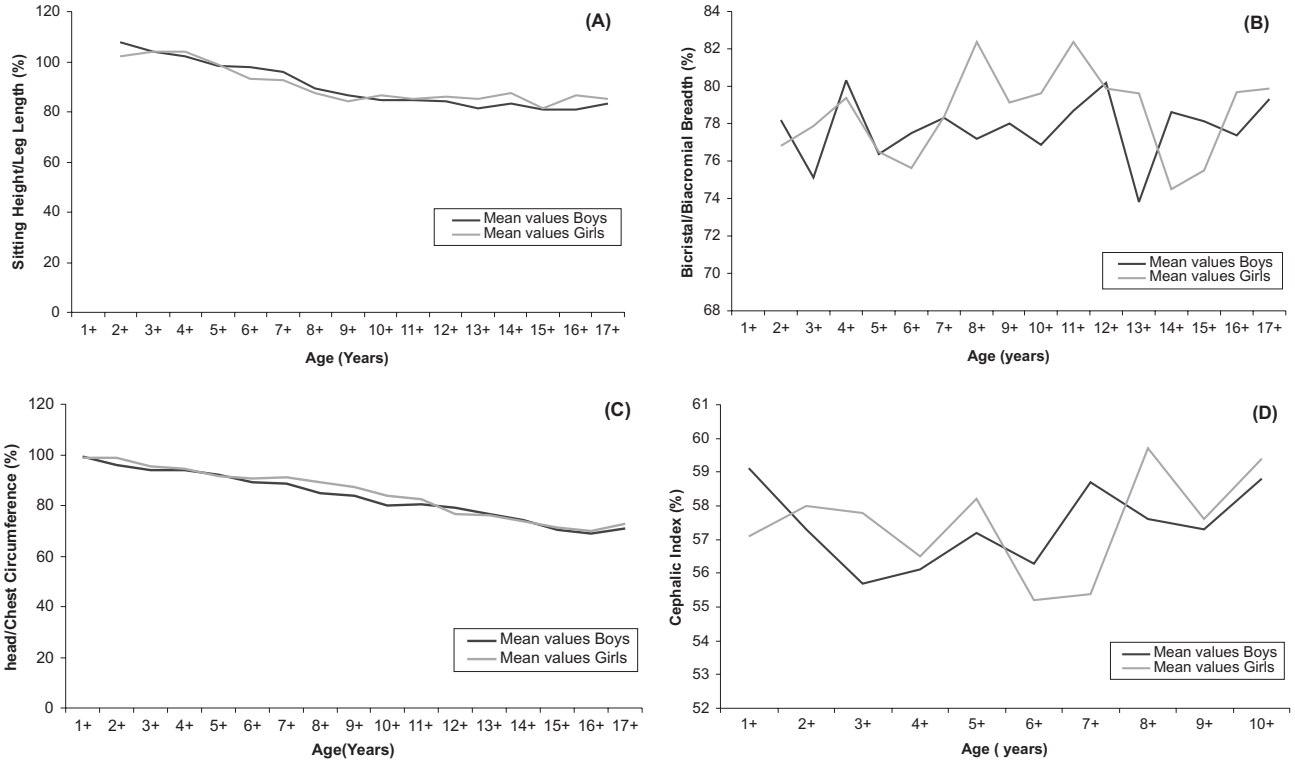

Fig. 4. Graphical Presentation of Mean ratios of sitting height / leg length (A), bicristal / biacromial breadth (B), head /chest circumference (C) and cephalic index (D).

height though the highest increment (8.4 and 8.5 cm) in leg length was more or less similar between 8–9 years of age in both sexes. Similar to height, mean leg length in boys was insignificantly higher in comparison to girls in almost in all age groups while mean sitting height was insignificantly more in girls beyond age 12 years.

Similar to other linear measurements, Head length and breadth were measured up to age 11. Maximum gain for head length was 0.5 cm among boys between 2–3 years of age. In girls, it was 0.8 cm between 2–3 and 9–10 years of age. As evident from Figure 2C, gain per year in head length was negligible in both sexes beyond 4 years of age. Significant difference ($t=2.98$; $p<0.005$) in mean head length was observed only at age group 8–9 years between boys and girls. The total increase in head breadth was 1.2 cm in boys and 2.1 cm in girls from one to eleven years of age. Mean head breadth in girls was significantly lower than the boys between ages 1–2 ($t=3.05$; $p<0.05$) and 7–8 years ($t=4.55$; $p<0.0001$). More or less consistent mean gain per year in chest breadth revealed steady growth in each successive age with maximum increase in boys was 1.1 cm between 12–13 years of age and in girls, it was 1.9 cm between 10–11 years of age. Mean chest breadth in girls was relatively smaller below 10 years of age than those of corresponding boys. However, significant difference in the mean chest breadth was found between girls and boys at age groups of 8–9 years ($t=2.16$; $p<0.05$) and 9–10 years ($t=3.71$; $p<0.001$).

Unlike head and chest breadth, increase in biacromial breadth at each age was less steady in both sexes. More than 2 cm increase in biacromial breadth in boys was observed between 3–4, 5–6, and 15–16 years of age. In girls, similar increase was noted between 5–6 and 12–13 years of age. The mean biacromial breadth in the age group of 16–17 years was highly significant ($t=4.0$; $p<0.0001$). Similar pattern of growth was observed for bicristal breadth in both sexes. The maximum gain in boys (1.7 cm) was noted between 14–15 years of age; in girls it was 2.5 cm between 16–17 years of age. The higher gain in girls for bicristal breadth indicate broader pelvis in girls than boys but converse trend was observed for biacromial breadth. Figure 3A and 3B did not reveal any clear-cut peak velocity for biacromial breadth and bicristal breadth either in boys or in girls at pubertal age.

Overall mean increase for head circumference from age 1–18 years was 10.9 cm in boys with maximum gain of 3.4 cm at age two. In girls it was 11.5 cm with maximum gain of 2.3 cm at age eight. Significantly higher head circumference in boys than girls were observed at ages 2–3 ($t=2.86$; $p<0.01$), 4–5 ($t=4.04$; $p<0.0001$) and 11–12 ($t=2.45$; $p<0.05$) years of age yet the mean head circumference at age 18 was alike in both sexes. Highest gain for chest circumference was noted for boys (5.3 cm) between 2–3 years of age followed by 4.9 cm between 15–16 years of age. In girls it was 3.6 and 3.5 cm between 5–6 and 15–16 years of age. However mean chest circumference exhibits significantly lower in girls between age groups of 2–3 years ($t=4.24$; $p<0.0001$) and 7–8 years ($t=3.75$; $p<0.0005$). Figure 3C showed steady gain per

year with no defined peak velocity for this measure in both sexes. Mean values for arm circumference at each successive age revealed more or less same in boys and girls barring from 12–15 years of age. However the significant difference ($t=3.33$; $p<0.005$) was observed only between 14–15 years of age. Growth variation without any noticeable spurt during pubertal age for arm circumference in either sex is apparent from Figure 3D.

Unlike length, breadth and circumferential measurements, mean biceps skin fold showed decrease in both sexes up to 6 years of age followed by more or less static growth in girls from six to twelve years of age. In boys, it was from six to fifteen years of age. On the contrary, Figure 2D showed continued decrease for triceps skin fold in boys up to age 15 followed by progressive increase, while the girls followed no consistent pattern. Boys and girls were differing significantly for triceps between age groups of 3–4 ($t=2.02$; $p<0.05$); 14–15 ($t=2.53$; $p<0.025$) and 15–16 years ($t=2.91$; $p<0.005$) while for biceps it was significant ($t=2.57$; $p<0.015$) only in the age group of 15–16 years.

Pattern of proportionate changes

Steady decrease with increase of age in the mean ratios of sitting height / leg length in both sexes was evident (Figure 4A). It indicated relatively more growth gain for leg length than sitting height throughout the growth period and more so upto 11 years of age. This depicts that sitting height attained maximum growth at later ages in both sexes. Mean ratios for Bicristal breadth / Biacromial breadth showed inconsistent pattern in both sexes with increase of age though higher increase in mean ratios beyond seven years of age had been suggestive of higher growth for bicristial breadth compared to biacromial breadth in girls (Figure 4B). In contrast, Baiga boys had relatively broad shoulder and narrow pelvis. Mean ratios for Head circumference / Chest circumference in the studied children showed constant decline from 99.5–70.9 cm with each successive age group. Figure 4C further showed over stripping of chest circumference beyond age 2 years in both sexes. Evidently, Mean ratios for Cephalic Index in both sexes showed almost straight line from age one to eleven years (Figure 4D) indicating that head grows proportionately more or less equal in breadth and length alternatively with advance of age. The minimum to maximum mean ratios in boys (55.7–59.2 cm) and in girls (55.2–59.7 cm) for cephalic index varied narrowly with advance of age. This phenomenon reflects little post natal growth in different dimensions of head.

Discussion

The study aimed to understand growth profile of children of primitive Baiga tribe and to assess relative changes in the body growth. Baiga children were considerably heavier at all ages when compared with non-primitive tribal children (Murias, Marias, Bhatras, Halbas, Gonds and Khonds)[26], but they matched well with Kanwar and Oraon tribal children up to 12 years of age[27] and with Gond children[29]. Baiga children of both sexes were also found to be heavier than primitive tribal children of Sugalis of Andhra Pradesh (AP)[30] and Kamar of MP[31] but lighter than Bharia children of MP[32]. Weight of Baiga children was lower but comparable with all India rural children[20] and was at par with 3rd percentile when compared with National Centre for Health Statistics (NCHS) standard[38]. Baiga children of both sexes were relatively taller than the non primitive tribal children of MP[26, 27] but comparable with Gond children[29]. Mean height of the present children below 9 years of age were noted to be smaller when compared with Kamar[31] and Bharia children[32] but reverse trend was observed with Sugali children[30]. Nevertheless they were slightly taller in comparison to all India rural children[20] but were close to 10th percentile of NCHS data[38].

Baiga boys had comparatively lower sitting height in almost at all ages than Bharia[32] and all India rural children[20] while Baiga girls had more sitting height than Bharia girls[32] and found close to all India rural girls[20]. However sitting height of Baiga children were comparable with children of Kamar tribe of MP[31]. This indicates relatively larger trunk of Baigas compared to children of other tribes. Head circumference in Baiga boys and girls were relatively more than Sugalis[30] and Bharia children[32] while arm circumference were lesser than Kamar[31] and Bharia children[32] but comparable with Sugalis children at each age[30]. Baiga boys and girls after preschool age had higher head and similar arm circumference when compared to all India rural children[19] at each corresponding age but were below 3rd percentile of NCHS standards[38]. Chest circumference was relatively higher in Bharia[32] and lesser in Sugalis children[30] compared to present children. Biacromial and bicristal breadth of present children were slightly less in comparison to Kamar[31] and Sugali children[30] but closer to Gond children[29] revealing their lean body. The studies conducted on Baiga children by Gautam[33,34] were only available for comparison. Its findings were comparable with the present findings for weight, height, sitting height, Length and circumferences of Head in both sexes though sample size was relatively small. However, the mean values of Head breadth was much higher compared to the present study. Similarly chest circumference in girls was averagely high[34]. However, data for leg length was not available.

Skin folds followed converse pattern of growth than those of length, breadth and circumferences. Deposition of Biceps and Triceps fat folds were lesser in the present children of both sexes compared to Bharia children[32] and had higher than Sugalis of AP[30] and non-primitive tribal children[26,27] and Gond children[29]. Mean triceps of Baiga children at each age were below 3rd percentile compared to NCHS standards[38].

In order to provide more objectivity in understanding proportionate growth changes, four ratios as stated above have been computed to understand the relative growth changes in body of the studied children. Earlier reports mentioned the differences in degree and timings of the

growth of various body segments like absolute measurements[39–41]. The findings of these ratios showed relatively higher growth in leg length than sitting height. On the other hand, biacromial breadth is relatively higher in boys while bicristal breadth was relatively more in girls. These measurements alone are sufficed to determine sex. It is well recorded in literature that pelvis increase much more than shoulder in girls while converse situation is found in males[39,42–44]. Negligible growth observed in Cephalic index during post natal growth depicted that head shape is determined prior to birth of the child. All these findings are well reflected in the respective indices and are similar to earlier findings and matched well with Indian Punjabi girls[44]. No study on Indian tribes was available for comparison.

To conclude, Baiga children follow growth pattern and rate similar to children of any other part of the country or of the world for absolute and relative measures as well. Nonetheless, the growth attained in each successive age were so low in both sexes to the extent that boys were not found to differ significantly than their corresponding girls in almost in all age groups. Nor peak spurt was observed in any of the studied measurements. This is probably due to low intensity of growth. Further the observations made through the four indices are suggestive of that Baiga children are genetically better controlled.

REFERENCES

1. CURRIMBHOY Z, Indian J Child Hlth, 12 (1963) 627. — 2. UDANI PM, Indian J Child Hlth, 12 (1963) 593. — 3. GHAI OP, SANDHU RK, Indian J Pediatr, 35 (1968) 91. — 4. DATTA BANIK ND, NAYAR S, KRISHNA R, RAJ L, TASKAR AD, Indian J Pediatr, 37 (1970) 453. — 5. VIJAYRAGHAVAN K, SINGH D, SWAMINATHAN MC, Indian J Med Res, 62 (1974) 994. — 6. SINGH R, Ann Hum Biol, 2 (1975) 301. — 7. SATHYAVATHI K, AGARWAL KN, Indian Pediatr, 16 (1979) 271. — 8. HAUSPIE RC, DAS SR, PREECE MA, TANNER JM, Ann Hum Biol, 7 (1980) 429. — 9. KAUL S, Indian Pediatr, 20 (1983) 391. — 10. QAMRA SR, MEHTA S, DEODHAR SD, Indian Pediatr, 28 (1991) 147. — 11. AGARWAL DK, AGARWAL KN, Indian Pediatr, 31(1994) 377. — 12. RAO S, JOSHI S, KANADE A, Indian Pediatr, 35 (1998) 619. — 13. KHADILKAR VV, KHADILKAR AV, COLE TJ, SAYYAD MG, Indian Pediatr, 46 (2009) 477. — 14. BANERJEE SR, CHAKRABARTY S, VASULU TS, BHARATI S, SINHA D, BANERJEE P, BHARATI P, Indian J Pediatr, 76 (2009) 391. — 15. BHARATI P, BHARATI S, PAL M, CHAKRABARTY S, SOM S, GUPTA R, Coll Antropol, 33 (2009) 7. — 16. ADAK DK, TIWARI MK, RANDHAWA M, BHARATI S, BHARATI P, Coll Anthropol, 26 (2002) 501. — 17. HANUMANTHA RAO D, SATHYANARAYANA K, GOWRINATH SASTRY J, Eco Food Nutr, 4 (1976) 237. — 18. SAROJ A, RAO KV, Secular trends in heights of rural Hyderabad adults. In: Proceedings (National Seminar on Statistics and Medicine Health and Nutrition, 1988). — 19. CHATTERJEE S, MANDAL A, Indian J Med Res, 94 (1991) 346. — 20. INDIAN COUNCIL OF MEDICAL RESEARCH, Growth and Physical Development of Indian Infants and Children. Technical Report Series, No. 18. (ICMR, New Delhi 1972). — 21. MITRA M, SINGHROL CS, Act Med Aux, 17 (1985) 271. — 22. VASHISHT RN, KRISHAN K, DEVILAL S, Indian J Pediatr, 72 (2005) 573. — 23. SACHAR RK, SINGH H, SONI RK, SINGH WP, BHATIA RC, RAIZADA N, SINGH B, Ind J Matern Child Health, 8 (1997) 21. — 24. SIDHU S, Ind J Matern Child Health, 6 (1995) 46. — 25. VASHISHT RN, KRISHAN K, KAUR C, Pb Univ Res Bull (Sci), 53 (2003) 35. — 26. SHARMA JC, Nutritional status and Physical growth and composition of certain Indian tribes. Circulated in seminar on Tribal situation in U.P. (Lucknow, 1988). — 27. MUKHERJEE DP, BISWAS SK, DHAR P, Hum Sci, 37 (1988) 225, — 28. MOITRA A, CHOUDHARY RP, Ind J Med Res, 94 (1991) 64. — 29. QAMRA SUNEEL, ROY JYOTIRMOY, SHRIVASTAVA PRAVAL, Impact of sickle cell on Physical growth of tribal children in Mandla district of Madhya Pradesh, India. (2009) Regional Medical Research Centre for Tribals, (ICMR), Jabalpur M.P. India (Circulated in 16th World Congress of The International Union of Anthropological and Ethnological Sciences at Kunming China, 2009). — 30. REDDY PYB, RAO AP, Ann Hum Biol, 27 (2000) 67. — 31. MITRA M, KUMAR PV, GHOSH R, BHARATI P, Coll Antropol, 26 (2002) 485. — 32. TIWARI MK, SHARMA KKN, BHARATI S, ADAK DK, GHOSH R, BHARATI P, Coll Antropol, 31 (2007) 95. — 33. RAJESH K. GAUTAM, Physical Growth and Body Composition among two male populations of Central India - Baiga (Primitive Tribe) and Brahmin,. In: Contemporary Studies in Anthropometry (Ed.) A.N. Sharma (Sarup and Sons, New Delhi. 2007). — 34. RAJESH K. GAUTAM, Physical Growth and Body Composition among two female populations of Central India— Baiga (Primitive Tribe) and Brahmin, In: Contemporary Studies in Anthropometry (Ed.) A.N. Sharma, (Sarup and Sons, New Delhi. 2007). — 35. CENSUS OF INDIA 2001 (India, States & Union territories) Basic Population Data, T00-005: Total Population, Population of Scheduled Castes and Scheduled Tribes and their proportion to the total population. Available from: URL: http://www.censusindia.net/t_00_005.html. — 36 GOVERNMENT OF MADHYA PRADESH: Tribal Sub Plan. Available from: URL: http://www.mp.gov.in/tribe/TSP_noh.pdf. — 37. WEINER JS, LOURIE JA, Human Biology: A guide to field methods, International Biological Programme. Hand book No. 9 (Oxford Blackwell Scientific Publication, 1969). — 38. MCDOWELL MA, FRYER CD, HIRSCH R, OGDEN CL, Anthropometric Reference Data for children and adults: US Population, 1999–2000.(Advance Data, CDC) from Vital and Health Statistics, (2005) 1. — 39. TANNER JM, Growth at adolescence, 2nd Edition, (Blackwell Scientific Publication,Oxford,1962). — 40. HIRENAUX J, Hum Biol, 36 (1964) 273. — 41. MARSHALL WA, Brit Med Bull, 37 (1981) 273. — 42. SATHYAVATHI K, AGARWAL KN, AGARWAL DK, Indian J Med Res, 74 (1981) 56. — 43. FAUST MS, Monographs Soc Res Child Dev, 42 (1977) 1. — 44. QAMRA SR, Mixed longitudinal study on physical growth & sexual maturity in females in relation to nutrition & SE status. Ph.D. thesis. In India (PGIMER, Chandigarh, 1984 (Unpublished).

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PROFIL RASTA DJECE IZ BAIGE – PRIMITIVNO PLEME OKRUGA DINDORI, MADHYA PRADESH, INDIJA

S A Ž E T A K

Ova studija provedena je na 795 djece iz Baige (453 dječaka i 342 djevojčice) iz područja Baiga-chak okruga Dindori u Madhya Pradesh (MP) u dobi od 1–18 godina s ciljem razumijevanja njihovog profila razvoja transverzalnim istraživanjem. Korišteno je 14 mjera tijela (težina, visina, sjedeća visina, duljina, težina, opseg i kožni nabori). Četiri indeksa, sjedeća visina/duljina noge, širina natkoljenice/širina potkoljenice, opseg glave/opseg grudnog koša i cefalični indeks izračunati su za istraživanje proporcionalnih promjena tijela. Sve mjere tijela, izuzev kožnih nabora, povećavaju se progresivno u svakoj dobnoj skupini, pokazujući neznačajnu razliku među dječacima i djevojčicama u većini dobnih skupina i bez očitog skoka u brzini tijekom puberteta kod oba spola. Međutim, kožni nabori pokazali su nedosljedan obrazac u svakoj sljedećoj dobi. Djeca uključena u istraživanje malo su teža i viša nego djeca iz plemena u drugim područjima, ali lakša i niža od djece iz Bharie[32]. Međutim, djeca uključena u istraživanje usporediva su sa svom ostalom ruralnom djecom u Indiji[20], ali spadaju ispod desetog percentila kada se uspoređuju sa standardima Nacionalnog centra za zdravstvenu statistiku[38]. Izostanak ubrzanog rasta u pubertetu i slab razvoj među istraživanom djecom mogući su zbog niskog intenziteta stope rasta. Proporcionalne promjene uočene u ovoj studiji slične su onima među djevojčicama indijskog Punjaba.