

Somatotypes of Urban Meiteis of Imphal, Manipur

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ABSTRACT Anthropometric somatotypes of urban Meiteis, ranging in age from 6 to 13 years, are described with a view to assessing the gender and age differences. Cross-sectional data on 340 children (171 boys and 169 girls) was collected from various schools of Imphal town of Manipur State. Each individual was somatotyped with the help of Heath-Carter anthropometric protocol using a set of ten body measurements. The average somatotypes for boys and girls were 1.8-3.6-4.2 and 2.1-3.2-4.1, respectively, and are classified as mesomorphic ectomorph. On the whole, the girls were significantly more endomorphic and the boys more mesomorphic; the differences were not significant in ectomorphy. A one-way ANOVA showed no significant sex differences in whole somatotypes, except at 8 years. A one-way MANOVA using Wilk's Lambda as test statistics revealed no significant age differences in somatotypes in both the sexes. The urban Meiteis were more ectomorphic than Gaddi Rajputs and Chamba Brahmins and Rajputs.

INTRODUCTION

Somatotyping is a useful technique for assessing human body shape and composition independent of size. It is a method by which size-dissociated body morphology is expressed by a 3-number rating representing the components of endomorphy, mesomorphy, and ectomorphy. The technique which was described for the first time by Sheldon et al. (1940), has since been used in its original and modified form in a variety of ways, such as population variation in physique and growth (Bailey et al., 1982; Carter and Heath, 1990), physique and sports performance (Tanner, 1964; Carter, 1984; Borms et al., 1984; Withers et al., 1987; Lasan, 1998), nutrition (Laskar, 1947), effects of disease on physique (Damon, 1970; Fredman, 1972; George, 1985; Gaur and Sarkar, 1998), age differences (Gaur and Singh, 1997), etc.

Data on physique characteristics of Indian populations is limited and only a handful of reports (Berry and Deshmukh, 1964; Berry, 1972; Singh and Sidhu, 1980; Singh, 1981; Singal and Sidhu, 1984; Singh et al., 1986, 1988; Singh and Bhasin, 1990; Bhasin and Singh, 1991; Singh and Singh, 1991; Gaur and Singh, 1997; Gaur and Sarkar, 1998) consider somatotypes. Many

of these reports are based on small samples and most deal with populations from North India. Data on physique characteristics of populations from northeast India is scanty and no report has been published on the physique of Manipuris. Given the limited data available on somatotypes in India, in general, and northeast India in particular, the present study considers the somatotypes of Manipuri children ranging in age from 6 to 13 years. The study also investigates the gender and age-associated variation in physique among the urban Meiteis from Imphal.

MATERIALS AND METHODS

For the present study a cross-sectional sample of 340 children (171 boys and 169 girls) was collected from Don Bosco High School, St. Patrick's High School, and Manipur Public School of Imphal, Manipur, during September-October, 1994. The children ranging in age from 6 to 13 years were mainly from middle-class family backgrounds. The sample was divided into 8 age groups of one year each using age midpoints. Thus, age group 6 included children with decimal ages ranging from 5.5 to 6.49 years. Only healthy and normal individuals were included in the study.

Somatotypes for each individual were determined employing Heath-Carter anthropometric somatotype method given in Carter and Heath (1990). All the ten measurements, viz. weight, stature, bicondylar breadths of the humerus and femur, flexed upper-arm and calf circumferences, and the triceps, subscapular, supraspinale, and median calf skinfolds, were taken with standard instruments following the protocols given by Carter and Heath (1990). The individual component ratings were computed using the algorithms given in Carter and Heath (1990) and the X and Y co-ordinates for each subject were calculated using the formulae of Carter et al.

(1983). Mean somatotypes were plotted on somatoplots using X and Y co-ordinates on a superimposed grid system. Descriptive statistics were calculated for HWR ($ht/\sqrt[3]{wt}$) and the three somatotype components, viz. endomorphy, mesomorphy, and ectomorphy. Age-wise sex differences for whole somatotypes were calculated using a one-way ANOVA following Carter et al. (1983). The student's t-test was used to find out the significance of sex differences for each somatotype component. To test the significance of age differences, somatotypes were analyzed by a one-way MANOVA, which used Wilk's Lambda as the test statistics (Cressie et al., 1986). In case of a significant Lambda, pairwise comparisons of means of various age groups were conducted using Hotellings T^2 (Cressie et al., 1986).

Imphal City is the district headquarter and the capital of Manipur State. This area is chiefly populated by Meiteis, though isolated pockets of tribal inhabitants are found at many places, besides some non-Manipuri migrants. The Meitei community is an amalgamation of 7 different exogamous clans ('Yek-Salai') namely, Mangang, Moirang, Luwang, Khumal, Angom, Khaba-nganba, and Chenglai. Traditionally, Meiteis are patrilineal and endogamous within the Meitei community. Religiously, Meiteis may

be broadly divided into followers of 'Hinduism' (an inducted religion) or those who follow 'Sanamahism' (the original Meitei religion).

RESULTS AND DISCUSSION

Table 1 shows the age and sex-wise descriptive statistics of the three somatotype components along with HWR of urban Meiteis of Imphal. As can be seen in the table, the mean HWR in boys decreased up to 8 years and then gradually increased up to 12 years. In females, however, the mean HWR values, by and large, showed a general increasing trend from 42.7 at 6 years to 45.4 at 13 years. The males had higher mean HWR values at 6, 7, 10, 11, and 12 years but the differences were not statistically significant, except at 8 years.

The mean endomorphy in males decreased up to 10 years and gradually increased, thereafter. No clear trend could be observed for endomorphy in females, which showed a fluctuating pattern. Endomorphy in females increased from 2.1 at 6 years to 2.2 at 13 years, but the differences in mean endomorphy at various ages were very little. At all ages, the females were more endomorphic than males and at most ages differences were significant ($P \leq 0.05$), as indicated by the students t-test.

Table 1: Somatotype characteristics ($\pm$ SD) of urban Meiteis of Manipur according to age and sex

Age Grp. (Yrs.)	N	HWR	Endomorphy	Mesomorphy	Ectomorphy
<i>Males</i>					
6	11	44.2 $\pm$ 2.28	2.0 $\pm$ 0.18	3.6 $\pm$ 0.96	3.8 $\pm$ 1.59
7	23	44.1 $\pm$ 1.42	1.9 $\pm$ 0.27*	3.9 $\pm$ 0.92	3.7 $\pm$ 1.03
8	19	43.9 $\pm$ 1.39*	1.9 $\pm$ 0.22*	4.0 $\pm$ 0.54*	3.6 $\pm$ 1.02*
9	27	44.4 $\pm$ 1.35	1.8 $\pm$ 0.31*	3.8 $\pm$ 0.76*	3.9 $\pm$ 0.99
10	26	45.1 $\pm$ 1.61	1.7 $\pm$ 0.51	3.3 $\pm$ 0.81	4.4 $\pm$ 1.18
11	21	45.1 $\pm$ 1.34	1.7 $\pm$ 0.16*	3.5 $\pm$ 0.73*	4.4 $\pm$ 0.98
12	36	45.5 $\pm$ 2.14	1.8 $\pm$ 0.61*	3.4 $\pm$ 1.38*	4.8 $\pm$ 1.53
13	8	45.1 $\pm$ 1.27	1.9 $\pm$ 0.80	3.3 $\pm$ 0.96	4.4 $\pm$ 0.93
6-13	171	44.8 $\pm$ 1.74	1.8 $\pm$ 0.44*	3.6 $\pm$ 0.95*	4.2 $\pm$ 1.26
<i>Females</i>					
6	9	42.7 $\pm$ 2.37	2.1 $\pm$ 0.20	4.3 $\pm$ 1.05	2.8 $\pm$ 1.60
7	17	43.0 $\pm$ 2.37	2.1 $\pm$ 0.33	4.1 $\pm$ 0.85	3.0 $\pm$ 1.50
8	25	45.1 $\pm$ 1.86	2.2 $\pm$ 0.37	3.3 $\pm$ 0.82	4.4 $\pm$ 1.37
9	21	44.5 $\pm$ 1.38	2.0 $\pm$ 0.30	3.3 $\pm$ 0.65	4.1 $\pm$ 1.04
10	20	44.7 $\pm$ 1.65	1.9 $\pm$ 0.21	3.2 $\pm$ 0.87	4.1 $\pm$ 1.21
11	23	44.8 $\pm$ 1.58	2.1 $\pm$ 0.55	3.0 $\pm$ 0.80	4.2 $\pm$ 1.15
12	33	45.2 $\pm$ 1.62	2.0 $\pm$ 0.41	2.7 $\pm$ 0.80	4.5 $\pm$ 1.12
13	21	45.4 $\pm$ 1.64	2.2 $\pm$ 0.71	2.6 $\pm$ 0.77	4.7 $\pm$ 1.20
6-13	169	44.7 $\pm$ 1.88	2.1 $\pm$ 0.43	3.2 $\pm$ 0.93	4.1 $\pm$ 1.34

* Significant difference between sexes ($P \leq 0.05$)

The mean mesomorphy in females decreased with age from 4.3 at 6 years to 2.6 at 13 years. In males it increased up to 8 years and decreased thereafter, with some variations at 10 years. Initially, up to 7 years the girls had higher mean mesomorphy values but afterwards the boys overtook the girls. The sex differences were significant at 8, 9, 11, and 12 years.

The mean ectomorphy in boys marginally decreased up to 8 years and then increased until 12 years. In girls, the mean ectomorphy, by and large, increased with age. Up to 7 years the boys were more ectomorphic than the girls and thereafter the girls showed slightly higher mean ectomorphy values. However, the sex differences in ectomorphy were not significant, except at 8 years.

The sample mean somatotypes for boys and girls were 1.8-3.6-4.2 and 2.1-3.2-4.1, respectively, which could be classified as mesomorphic ectomorph for both sexes. Figure 1 depicts the mean somatoplots of various age groups of urban Manipuri boys and girls. Up to 9 years the mean somatoplots of Manipuri boys fall in the mesomorph-ectomorph sector and thereafter move to the mesomorphic ectomorph sector of the somatochart. In case of girls, the somatoplots of mean somatotypes fall in the ectomorphic mesomorph sector up to 7 years; from 8 years onwards the somatoplots are distributed in the mesomorphic ectomorph sectors of the somatochart.

A one-way ANOVA was used to find out the significance of age-wise sex differences in the whole somatotypes, following Carter et al. (1983), and the results are presented in table 2. As can be seen in the table, except for age group

8, the F-ratios were statistically not significant, indicating no significant difference in mean somatotypes of boys and girls at various ages considered in this study. This may be related to the fact that majority of the sex differences in body morphology probably fully manifest at the time of puberty under the influence of sex hormones.

A one-way MANOVA was used to find out the significance of differences in mean somatotypes due to age, following Cressie et al. (1986). The MANOVA resulted in Wilk's Lambda values of 0.8556

($F_{21, 463} = 1.12$) and 0.8281 ($F_{21, 457} = 1.49$), for boys and girls, respectively, which were not statistically significant ($P \leq 0.05$). Since the Wilk's Lambda in both the sexes was not significant, Hotelling's T^2 test was not necessary. Thus, there were no significant age differences in mean somatotypes among the urban Meiteis of Imphal.

The children in the present sample were compared component-wise with available published data on somatotypes of comparable age, viz. Gaddi Rajput boys (Singh and Sidhu, 1980), Rajput boys of Chamba (Singh and Singh, 1991) and Rajput and Brahmin girls of Chamba (Singal et al., 1990) (Fig. 1). The Manipuri boys were more endomorphic than the Gaddi boys at 8, 12, and 13 years. In mesomorphy, the boys in the present sample were ahead of Gaddi Rajputs, except at 6 and 10 years. By and large, the Manipuri boys were clearly more ectomorphic than Gaddis. When compared with 11-13 year old Rajput boys of Chamba, the Manipuri boys were more ectomorphic and mesomorphic and less endomorphic. It is evident from figure 2 that the urban Manipuri girls in the present sample were distinctly less endomorphic and more mesomorphic than the Brahmin and Rajput girls of Chamba. On the average, the sample girls had higher mean ectomorphy values than the Chamba girls. The Manipuris are basically mongoloid in appearance and physical features (Brown, 1874). Therefore, the observed differences in somatotypes between Manipuri and Gaddi and Chamba children may be largely due to ethnic differences. Given the applications of somatotypes in anthropology, human biology, sports sciences, and disease and given also the

Table 2: Results of one-way ANOVAs for sex differences in whole somatotypes according to age of urban Meiteis of Imphal, Manipur

Age Group (years)	MSB	dfb	MSW	dfw	F
6	7.37	1	3.57	20	2.07
7	6.34	1	2.47	44	2.58
8	13.87	1	2.13	36	6.52*
9	4.57	1	1.63	52	2.80
10	1.08	1	2.29	50	0.47
11	4.99	1	1.94	40	2.58
12	8.96	1	3.48	70	2.57
13	4.03	1	2.51	14	1.61

* Significant difference between sexes ($P \leq 0.05$)

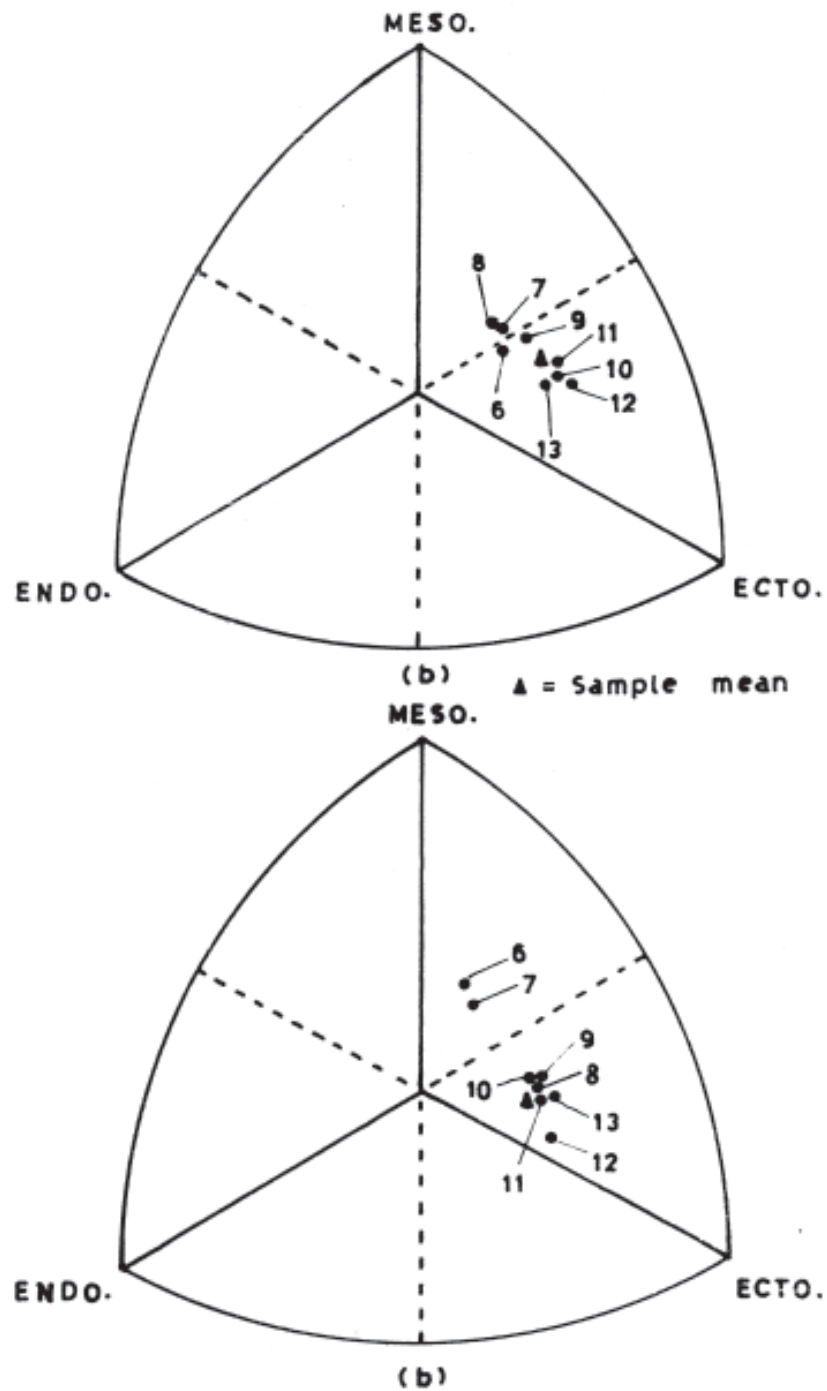


Fig. 1. Somatocharts showing somatoplots of mean somatotypes of various age groups of urban Meitei boys (1a) and girls (1b) of Manipur

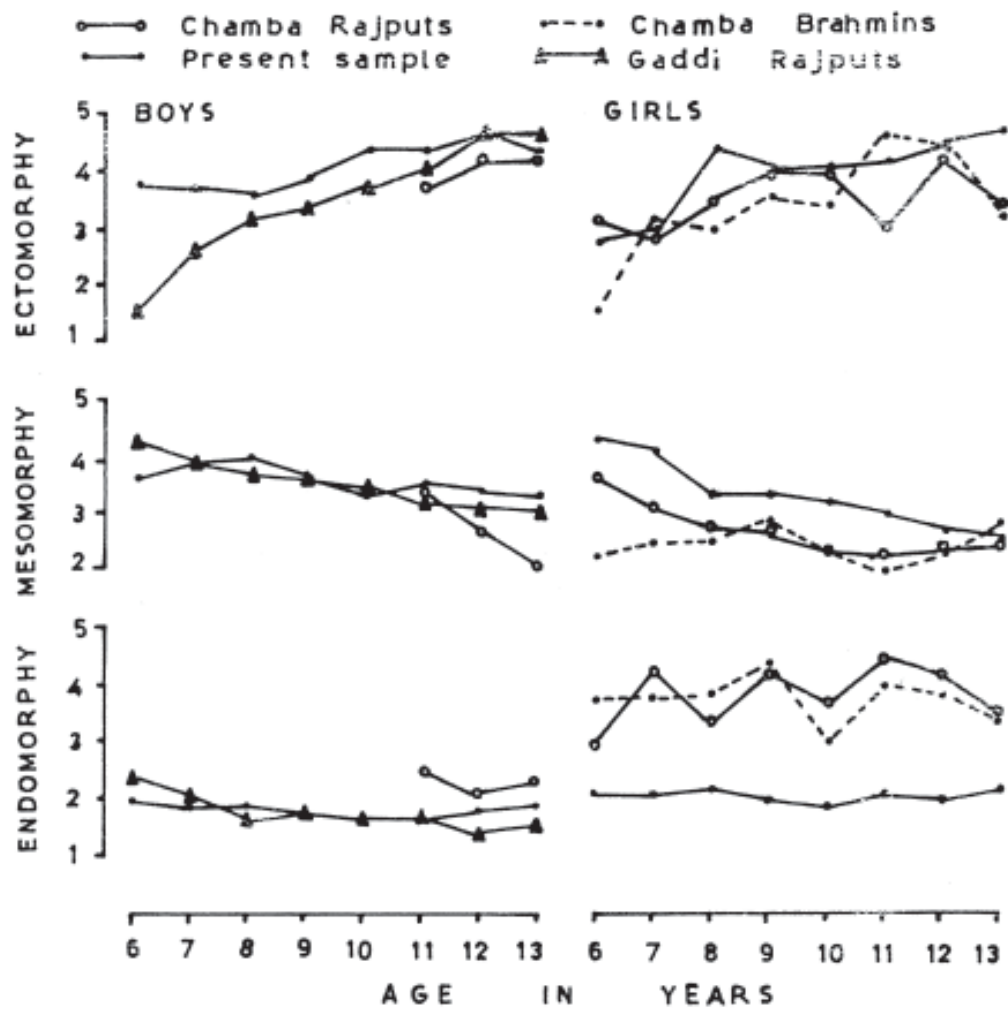


Fig. 2. Somatotype comparisons of urban Meitei children of Imphal with that of other populations

paucity of data in India, more studies are necessary to have a better understanding of the range of variation in physique in various populations of India.

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