

## Somatotype Changes During Adolescence in Gujjars and Tibetans of Jammu and Kashmir, India

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**ABSTRACT** In the present study, age changes in somatotypes in Gujjars (a transhumant community) and Tibetans (refugees settled in Ladakh) have been reported. Cross-sectional sample of 84 Gujjar and 123 Tibetan boys ranging from 8+ to 18+ years have been incorporated in the present study. Subjects were somatotyped after Heath and Carter (1967). There is not much change in the somatotype during adolescence. Ectomorphy remains dominant through growth phase, followed by mesomorphy and endomorphy. On somatograph, Gujjars lie in meso-ectomorphic sector and Tibetans are falling in balanced mesomorphic sector.

In the recent years, somatotyping has been established as useful meaning of describing body shape and form. In earlier studies, somatotype was assumed to be genetically determined, constant body form not undergoing any change (Sheldon et al., 1940, 1954, 1969). Later studies however, proved that somatotype ratings do undergo major change, especially during adolescence (Hunt and Barton, 1959; Barton and Hunt, 1962; Heath and Carter, 1971; Parizkova and Carter, 1976). In the present paper an attempt has been made to study somatotype changes during adolescence in Gujjars and Tibetans of Jammu and Kashmir.

### MATERIAL AND METHODS

The present study is based on a cross-sectional sample of 84 Gujjar and 123 Tibetan boys of Jammu and Kashmir state. Gujjars are a transhumant group who stay in low-altitude areas of Jammu province, but migrate during summer high in mountains of Jammu division, higher ranges of Kashmir valley and even to Ladakh. Tibetans, a refugee community who migrated from Tibet, and are settled in and around Leh (3514 m). The small sample size of Gujjars is due to inaccessibility of the transhumant group, while in case of Tibetan, the size of population is too small. Gujjar boys ranged from 9+ to 18+ years, whereas Tibetan boys were drawn from age group 8+ to 18+ years. The data were collected in the year 1989 from Jammu and Leh Dis-

tricts of Jammu and Kashmir. For the purpose of analysis the subjects were classified into age groups. The subjects, between age 8.00 to 8.99 years of age were grouped into 8+. The individuals selected for the study were normal, apparently healthy, unrelated subjects. The anthropometric measurements were taken, following the techniques described by Weiner and Lourie (1969) and Singh and Bhasin (1989). The anthropometric somatotype was computed after Heath and Carter (1967), and modified by Carter (1975).

### RESULTS AND DISCUSSION

The results of the present study are represented in tables 1 and 2. In general all the three somatotype components show no regular trend during the adolescent phase.

*a) Endomorphy:* In Gujjars, there is not much change in endomorphy during adolescence. The maximum value of endomorphy was observed at 14+ years while the minimum at 9+ in Gujjars. Whereas it show a regular decrease in Tibetans, it decrease from maximum at 8+ to minimum at 18+ years (Table 1).

*b) Mesomorphy:* In mesomorphy different trends have been observed for Gujjars and Tibetans. In Gujjars, the mesomorphy increases regularly during adolescence, whereas in Tibetans it decreases from 8+ to 13+ years and increases thereafter, except for a dip at 14+ years (Table 1).

Table 1: Somatotype components in Gujjars and Tibetans of Jammu and Kashmir

Age years	Endomorphy						Mesomorphy				Ectomorphy			
	Gujjars			Tibetans			Gujjars		Tibetans		Gujjars		Tibetans	
	N	Mean	S.D.	N	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
8+	-	-	-	12	2.57	0.41	-	-	3.89	0.50	-	-	3.92	1.33
9+	06	1.54	0.19	15	2.36	0.55	3.07	0.71	3.62	0.54	5.13	0.62	3.80	0.85
10+	09	1.29	0.42	11	2.19	0.49	2.87	0.70	3.41	0.49	5.10	0.96	4.03	0.73
11+	08	1.88	0.84	10	2.04	0.59	3.14	0.60	3.76	0.40	4.98	0.72	3.89	0.80
12+	14	1.52	0.45	10	2.12	0.57	2.87	0.81	3.52	0.40	5.39	0.63	4.13	0.14
13+	10	1.34	0.20	11	1.90	0.56	3.09	0.57	3.19	0.92	5.15	0.69	4.53	0.91
14+	09	1.94	0.86	07	1.93	0.49	3.34	0.97	3.67	0.57	4.63	1.10	3.86	1.36
15+	08	1.55	0.47	13	1.91	0.48	2.76	0.77	3.72	1.09	5.29	1.06	3.77	1.06
16+	10	1.53	0.45	20	1.90	0.59	2.87	0.94	3.60	0.54	4.99	1.07	4.07	0.96
17+	04	1.70	0.29	09	1.92	0.27	3.09	0.55	3.54	0.70	5.02	1.16	3.86	0.77
18+	06	1.79	0.91	05	1.72	0.34	3.05	0.60	3.41	0.59	4.87	0.26	4.12	1.25

Table 2: Somatotype Attitudinal Distance (SAD) and Somatotype Dispersion Distance (SDD) in Gujjars and Tibetans of Jammu and Kashmir

Age Interval	Somatotype Attitudinal Distance		Somatotype Dispersion Distance	
	Gujjars	Tibetans	Gujjars	Tibetans
	8+ - 9+	-	0.36	-
9+ - 10+	0.83	0.35	1.89	0.86
10+ - 11+	0.70	0.40	1.23	1.00
11+ - 12+	0.65	0.34	1.44	0.82
12+ - 13+	0.43	0.56	0.88	1.37
13+ - 14+	0.91	0.82	2.09	1.67
14+ - 15+	1.09	0.66	2.55	0.16
15+ - 16+	0.32	0.32	0.98	0.65
16+ - 17+	0.27	0.21	0.33	0.86
17+ - 18+	0.17	0.35	0.39	0.82
	Migratory Distance		11.78	8.71

c) *Ectomorphy*: For ectomorphy, no regular trend has been observed as such. It fluctuates between minimum at 14+ and maximum at 12+ years in Gujjars, and between a low at 15+ and high at 13+ years respectively for Tibetans (Table 1).

No regular spurt corresponding to adolescent growth spurt has been observed in somatotype components in Gujjars and Tibetans. Statistically non-significant differences have been observed in inter-group age-intervals. Mean somatotype values vary in the given order; the first component is lower than the second, while the third

component ratings are higher than first and second components (Table 1).

Carter (1975) divided somatochart into various sectors. According to sector division, the two population groups can be placed in two different sectors. In Gujjars, all the mean values except one at 9+ years lie in meso-ectomorph, whereas at 9+ it lies in balanced ectomorph sector. Whereas in Tibetans the case is reversed of what it is in Gujjars. In Tibetan all values lie in balanced ectomorph sector except at 13+ years when it lies in meso-ectomorphic sector (Figs. 1 and 2).

Change in somatotype components show that Gujjars, which are balanced ectomorphs at 9+ shift to meso-ectomorphic zone at age 10+ years onwards, whereas in Tibetan boys it remains in balanced ectomorph sector from 8+ to 18+ year with exception of 13+ years. From somatotype component dominance (Table 1), it is clear that there is no component dominance change during adolescent. The change in component dominance during adolescence has been reported by various studies (Parizkova and Carter, 1976; Walker, 1978), whereas Tanner (1970) reported that there is not much change in somatotype ratings during the course of growth. The present findings are showing similarities with the study on Dogras of Jammu Division of Jammu and Kashmir (Singh and Bhasin, 1990) that no change in component dominance occurs during adolescence, since in

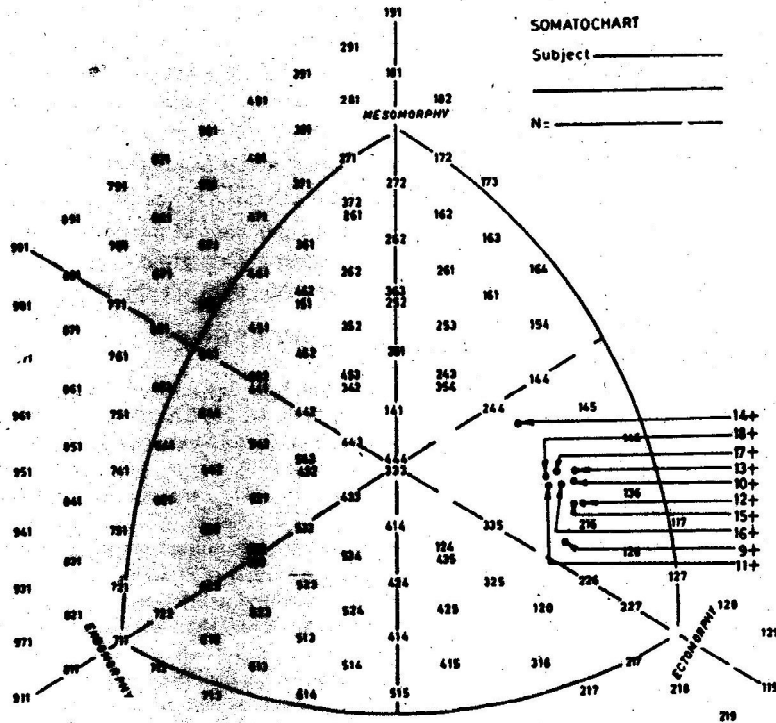


Fig. 1: Somatotype distribution in Gujjars of Jammu & Kashmir

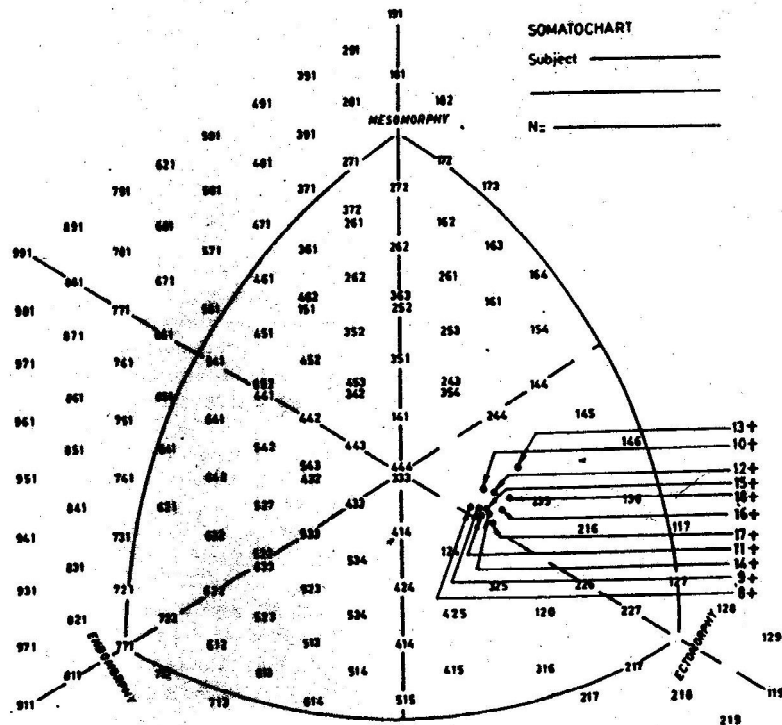


Fig. 2: Somatotype distribution in Tibetan of Jammu & Kashmir

most of the cases, somatotype do not change much during growth phase.

Somatotype Attitudinal Distance (SAD) and Somatotype Dispersion Distance (SDD) have been computed after Carter (1975). In Gujjars the highest value of SAD has been observed between 14+ and 15+ years (SAD = 1.09), whereas lowest value of SAD has been observed between 17+ and 18+ years (SAD = 0.17). In Tibetans the highest value of SAD has been observed between 13+ and 14+ years (SAD = 0.82) and lowest value has been recorded for age between 16+ and 17+ years (SAD = 0.21). In Gujjars the highest value of SDD has been observed between age interval 14+ and 15+ years (SDD = 2.55), while age interval 16+ and 17+ years show lowest value (SDD = 0.33). In Tibetans the highest value was observed between 13+ and 14+ years (SDD = 1.67) and lowest between 8+ and 9+ (SDD = 0.50).

Migratory distance (MD) was calculated by summing up SDD's between successive somatotype means. Gujjars show much fluctuation than Tibetans, where migration is more regularised.

Somatotype components of Gujjars and Tibetans of Jammu and Kashmir have been compared with Dogra Brahmans, Dogra Rajputs and Dogra Scheduled Castes of Jammu, Brahmans and Rajputs of Chamba and Gaddi Rajputs of Bhamour tehsil of Chamba district, Himachal Pradesh (Singh S.P. and Sidhu, 1980; Singh, L.P. and Bhasin, 1990; Singh L.P., 1987). Gujjars along with Dogra Brahmans, Rajputs and Scheduled Castes of Jammu district lie in same sector of somatochart *i.e.* mesoectomorph. Similarity of somatotype between Gujjars and other populations of same area show that to some extent somatotype is influenced by environmental factors. Whereas Tibetan, a high altitude group (3500 m) show balanced ectomorphy, comparable in mesomorphy and lower in ectomorphy than Dogra population groups of Jammu and Kashmir, whereas population groups from other regions show lower rating in somatotype components than Gujjars and Tibetans of Jammu and Kashmir.

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#### REFERENCES

- Barton, W.H. and Hunt, E.E.: Somatotype and adolescence in boys. *Hum. Biol.*, 34: 254-270 (1962).
- Carter, J.E.L.: *The Heath-Carter Somatotype Methods*. San Diego, California (1975).
- Heath, B.H. and Carter, J.E.L.: A modified somatotype method. *Am. J. Phys. Anthropol.*, 27: 57-74 (1967).
- Heath, B.H. and Carter J.E.L.: Growth and somatotype pattern of Manus children, territory of Papua and New Guinea: Application of a modified somatotype method to study the growth patterns. *Am. J. Phys. Anthropol.*, 35: 49-68 (1971).
- Hunt, E.E. and Barton, W.H.: The inconstancy of physique in adolescence of boys and other limitations of somatotyping. *Am. J. Phys. Anthropol.*, 17: 27-36 (1959).
- Parizkova J. and Carter J.E.L.: Influence of physical activity on stability of somatotype in boys. *Am. J. Phys. Anthropol.*, 44 : 327-340 (1976).
- Sheldon, W.H., Dupertius, C.W. and McDermott, E.: *Atlas of Men*. Harper Bros., New York (1954).
- Sheldon, W.H., Lewis, N.D. and Tanney, A.S.: Psychotic pattern and physical constitution. In: *Schizophrenia, Current Concepts and Research*, D.V. Siva Sankar (Ed.), PJD Publication, New York (1969).
- Sheldon, W.H., Stevens, S.S. and Tucker, W.B.: *The Varieties of Human Physique*. Harper Bros., New York (1940).
- Singh, I.P. and Bhasin, M.K.: *A Laboratory Manual on Biological Anthropology. Section I : Anthropometry*. Kamla-Raj Enterprises, Delhi (1989).
- Singh, L.P. : *Growth Patterns and Somatotype Changes Among Brahmin and Rajput Boys of Chamba (H.P.)*. M.Sc. Dissertation, Punjabi University, Patiala (1987).
- Singh, L.P. and Bhasin, M.K.: Somatotype changes in adolescence among Dogras of Jammu and Kashmir, India. *J. Hum. Ecol.* 1: 169-174 (1990).
- Singh, S.P. and Sidhu, L.S.: Changes in somatotype during 4 to 20 years in Gaddi Rajput boys. *Z. Morph. Anthropol.*, 71: 187-195 (1980).
- Tanner, J.M.: Physical growth. In: *Carmichael's Manual of Child Psychology*. P.H. Mussen (Ed). Wiley, New York 3rd Edition (1970).
- Walker, R.N.: Pre-school physique and late adolescent somatotype. *Ann. Hum. Biol.*, 5 : 113-129 (1978).
- Weiner, J.S. and Lourie, J. A. : *Human Biology. A Guide to Field Methods - IBP Handbook No. 9*. Blackwell, Oxford (1969).