

Secular Trends in Somatotypes Among Female University Students

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ABSTRACT The present study highlights secular trends in somatotypes in two populations of Punjabi females viz. Jat Sikh and Baniyas, examined during different time periods i.e. 1973 and 1997. Cross-sectional data was taken on 611 subjects; 311 during the first time and 300 during the second. The age group of the former group was 16-23 years while that of the latter was from 20-25 years. The two groups under investigation have shown positive secular trend for height and weight. The trend of endomorphy has registered an increase with the passage of time while ectomorphy value has declined. With time, mesomorphy increases in the Jat Sikhs and decreases in the Baniyas.

INTRODUCTION

During the past 150 years, secular trends have been operational which describe a trend of increase in body measurements alongwith earlier maturation of successive generations of human populations. Documented secular effects relate either to an increase in the rate of human growth and development, or to an increase in adult body size (Malina, 1990). Under improved environmental conditions, secular changes have been demonstrated in physical characteristics of new born babies, growing children and adults (Eveleth and Tanner, 1990).

The human body form has been studied scientifically and described extensively in the morphological, physiological and psychological context in early physique classifications (Tucker and Lessa, 1940a, b). Somatotyping is one of the established methods in human biology which has found wide applications in terms of growth, occupation, nutrition, sports activity, disease etc. (Carter and Heath, 1990). Eversince, somatotype method has not only been used in evaluating the age changes, growth and development but has also helped in highlighting population variation. A number of studies have revealed dynamic nature of somatotype of an individual with the passage of time (Singh, 1999).

Carter (1984) has observed changes in

somatotype over the years of female gymnasts, canoeists, track sprinters, hurdlers and male swimmers. Differences between the somatotypes of male Czechoslovak athletes in 1960-1970 period and 1978 onwards were observed by Stepnicka (1986). Many studies have been done in India which have highlighted changes in somatotype between different population groups and sportspersons (Singh and Sidhu, 1980; Singh, 1981; Singh and Sidhu, 1982; Sidhu et al., 1982; Singal and Sidhu, 1984; Singh and Malhotra, 1986; Kaul et al., 1996 and Carter, 1996). But there does not seem to be any specific studies which have elucidated the secular trends in somatotypes in north Indian populations. Therefore the present investigation is an attempt to discover the pattern of change in somatotypes over a period of 24 years in a female population of Punjab viz., Jat Sikh and Bania studied during two different time periods i.e. 1973 and 1997.

MATERIAL AND METHOD

The present paper is based on two sets of samples (total 611) taken on university women of Patiala, first during September - October, 1973 and then during September - December, 1997. The first study has been conducted on a cross-sectional sample of 311 women (150 Jat Sikh and 161 Bania) in the age range of 16-23 years and the second on 300 women (150 each belonging to both the groups) in the age range of 20-25 years. The data for both times were collected on Punjabi University girls, Patiala where the majority of the girls come from nearby towns and cities of Patiala district. It must be emphasized that the two samples attending the University came from the same region, were from the same endogamous group, from the same mendelian population and were nearly age matched.

Standard anthropometric techniques (Weiner and Lourie, 1969) were employed while collecting the data. Anthropometric somatotypes (Carter, 1975) were assigned to all the women.

RESULTS

A comparison of height and weight (Table 1) from the period 1973 to 1997 reveals that the Jat Sikh women have shown an increase in height from 157.91 ± 5.33 cm to 159.49 ± 5.37 cm. They weighed 46.89 ± 5.05 kg in the year 1973 as compared to 52.17 ± 4.83 kg in the year 1997. Thus, over this period of 24 years, height has shown an increase of 1.58 cm while there has been a weight gain of 5.28 kg. It seems likely that these are secular shifts in height and weight among Jat Sikh women.

The Bania women have also grown taller from 1973 to 1997, showing an increase from 154.28 ± 5.5 cm to 157.08 ± 5.50 cm (Table 2). Their weight has also increased from 42.42 ± 5.85 kg to 51.53 ± 4.88 kg. The increase in height over the past quarter of century is to the tune of 2.80 cm and for weight it is 9.11 kg. The Bania women have also shown positive secular trend for both height and weight.

The magnitude of secular shift in Jat Sikh women is 0.66 cm/decade for height and 2.2 kg/decade for weight. In case of Bania females the magnitude for height is 1.17 cm/decade and for weight it is 3.80 kg/decade.

A comparison of the somatotype values for judging the effect of secular trends in Jat Sikh and Bania females is given in Tables 3 and 4. For both the populations, the direction of change in the case of endomorphic component is towards increasing trend of fatness. In case of Jat Sikhs the value of endomorphic component has increased from 4.10 ± 0.96 to 4.50 ± 0.38 . As for the Banias the increase is from 4.22 ± 1.06 to 4.87 ± 0.45 . The pattern of change for mesomorphy is different for both the endogamous groups. The Jat Sikh girls show an increase in the mesomorphic component from 2.37 ± 0.66 to 2.63 ± 0.95 while the Bania girls have shown a decline from 2.32 ± 0.75 to 2.12 ± 0.91 . As for the ectomorphic component over the past quarter of a century the values have shown a decline from 3.61 ± 1.15 to 2.72 ± 1.00 for the Jat Sikhs and from 4.00 ± 1.27 to 2.35 ± 0.96 thereby showing a trend of substantial decrease. The overall somatotype difference between 1973 and 1997 of both the populations has been plotted in figure 1.

DISCUSSION

In the present study of Jat Sikh and Bania females an indication about the possible effects

Table 1: Height-weight comparisons between 1997 and 1973 studies for Jat Sikhs

Parameters	1997 study			1973 study			t-value
	Mean	S.D.	S.E.M.	Mean	S.D.	S.E.M.	
Height (cm)	159.49	5.37	0.44	157.91	5.33	0.44	2.54*
Weight (kg)	52.17	4.83	0.39	46.89	5.05	0.41	5.75*

* $p < 0.05$

Table 2: Height-weight comparisons between 1997 and 1973 studies for Bania

Parameters	1997 study			1973 study			t-value
	Mean	S.D.	S.E.M.	Mean	S.D.	S.E.M.	
Height (cm)	157.08	5.50	0.45	154.28	5.50	0.40	4.98*
Weight (kg)	51.53	4.88	0.39	42.42	5.85	0.46	15.11*

* $p < 0.05$

Table 3: Comparison of somatotypes of two studies in Jat Sikh women

Parameters	1997 study (N=150)			1973 study (N=150)			t-value
	Mean	S.D.	S.E.M.	Mean	S.D.	S.E.M.	
Endomorphy	4.50	0.38	0.03	4.10	0.96	0.08	4.44*
Mesomorphy	2.63	0.95	0.08	2.37	0.66	0.05	2.88*
Ectomorphy	2.72	1.00	0.08	3.61	1.15	0.09	7.41*

* $p < 0.05$

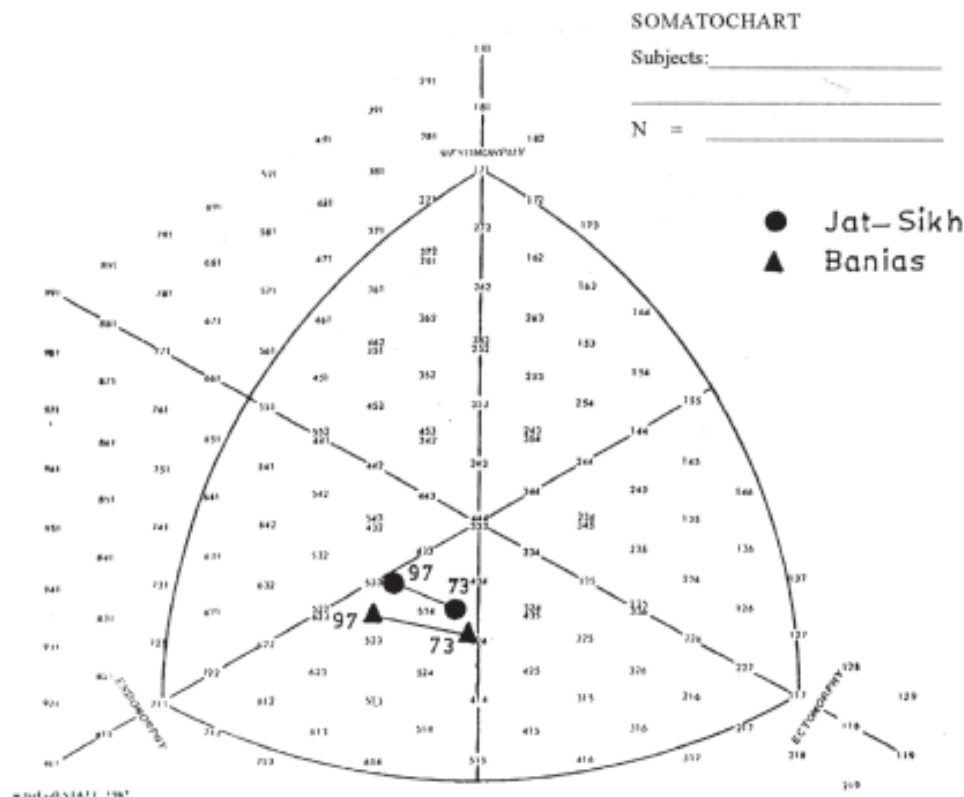
Table 4: Comparison of somatotypes of two studies in Bania women.

Parameters	1997 study (N=150)			1973 study (N=161)			t-value
	Mean	S.D.	S.E.M.	Mean	S.D.	S.E.M.	
Endomorphy	4.87	0.45	0.04	4.22	1.06	0.08	7.22*
Mesomorphy	2.12	0.91	0.07	2.32	0.75	0.06	2.22*
Ectomorphy	2.35	0.96	0.08	4.00	2.27	0.18	8.68*

*p < 0.05

of secular changes have been investigated with the help of a study conducted earlier on these two groups, roughly quarter of a century. Increase in the endomorphic ratings from 1973-1997 produces some reasonably persuasive evidence that the physical activity levels have considerably decreased from past to present. This again is coupled with sedentary life styles when energy intake exceeds energy expenditure. People who are regularly active are less likely to be obese

(Durnin, 1992; Saris, 1992; Glyptis, 1992). The endomorphic component has dominated over the mesomorphic and the ectomorphic component throughout. The differential dietary habits over the past quarter of the century, with less physically strenuous type of life patterns have contributed to the preponderance of endomorphic component and a reduction in the ectomorphic component. These seem to be some of the most commonly quoted reasons for the

**Fig. 1. Somatoplots of Jat Sikh and Bania women during 1973 and 1997**

operation of the secular trends in different settings.

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