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# Structural Profile and Fat Patterning Between Two Endogamous Groups of Punjabi Females

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**KEY WORDS** Punjabi Female. Jat Sikh. Bania. Fat Pattern. Circumferences, Skinfolds. WHR. BMI.

**ABSTRACT** A cross-sectional study on 300 females (150 each belonging to Jat Sikh and Bania groups) in the age range of 20-25 years was conducted with a view to exploring the structural and fat differentiation patterns. The Jat Sikh girls of the present study were found to be taller with bigger trunk than their Bania counterparts. On the other hand the Bania girls have registered larger skinfold values but smaller hip and shoulder circumferences. The skeletal diameters are greater in Jat Sikhs indicating greater development in them. The mean values for BMI, abdominal-hip ratio are more for the Jat Sikhs.

## INTRODUCTION

Fat patterning is a relatively new concept in human growth. It not only exhibits the relationship between central and peripheral fat stores, but also relates to the anatomical placement of adipose tissue. It is, therefore, distinct from differences amongst individuals in total adiposity. Information regarding adiposity tracking is derived mainly from skinfolds and waist-hip ratios. Centripetal patterning of fat, in which deposits of subcutaneous fat are greater on the trunk than on the extremities, is a risk factor in adults for non insulin-dependent diabetes mellitus (NIDDM) (Colditz, 1990; Ohlsson et al., 1985) and coronary heart disease (CHD) which are also influenced by other risk factors such as sedentary life style, hypercholesterolemia, hypertension, diabetes and obesity (Manson, 1990; Despres, 1990; Blair, 1993; Singh and Niaz, 1995). Adiposity is also considered as a predisposing factor for several other chronic diseases such as stroke (Dyken, 1984; Barrett-Connor, 1990), hypertension (Staessen, 1989; Schotte and Stunkard, 1990; Stamler et al., 1991; Williams et al., 1992), gall bladder disease (Liddle et al., 1989; Hartz et al., 1984), Osteoarthritis (Davis, 1988) and Cancer (Osler, 1987).

Modernisation has invaded our lifestyles to such an extent that drastic changes in the lifestyles of people have occurred. The outdoor physical activities during childhood and adolescence which used to be very frequent among the girls in the past have decreased dramatically. The habitual physical activities during the past were keeping the individuals healthy and physically fit. Now-a-days more and more people are enjoying the luxuries of life and this is reflecting on their lifestyles. The time spent on physical activity and outdoor games is decreasing day by day. When energy intake exceeds energy expenditure, excess of it is stored in the form of triglycerides, in adipose tissue. The caloric intake in middle class people is on the rise and with the changed scenario of physical fitness, people are becoming obese. The excess fat which is an inert mass is a big handicap in physical and mechanical efficiency of the body. The future mothers i.e. the young adults must be made aware of the amount of fatness in their bodies and its consequences. The purpose of the present study is to evaluate the status of fat patterning with the help of various circumferences and skinfolds between women of two endogamous groups of Punjab viz. Jat Sikh and Bania.

## MATERIAL AND METHOD

The data for the present cross-sectional study have been collected from the Punjabi University Girls Hostel during September-December, 1997. The girls residing in these hostels come from the adjoining areas of Patiala. Two population groups i.e. the Jat Sikhs and the Banias with contrasting lifestyle backgrounds were selected. The Jat Sikhs are usually agriculturists and include the greater mass of dominant land owners who are confined mainly to the rural areas. The Banias are traders and are considered to be the main commercial elements of Northern and North Western India. The sample comprises of 300 females (150 each for both the groups) in the age range of 20-25 yrs. Standard anthropometric techniques as described by Lohman et al. (1988) were followed while taking the measurements.

## RESULTS

The descriptive statistics for different variables of the two endogamous groups are presented in Table 1. Except for weight all other anthropometric variables show significant differences for Jat Sikhs as compared to the Banias.

Table 2 shows mean (± S.D.) and t-values for all the six circumferences for the samples of the present study. Except for abdominal and calf circumference all other circumferences exhibit greater values for Jat Sikh females as compared to Bania females. The differences however are significant for only hip and shoulder circumference while for all other circumferences, the differences are non-significant.

Table 3 shows the values for mean, S.D. and S.E.M. for various skinfolds between the two endogamous groups. All skinfold values are greater for the Bania females as compared to the Jat Sikh females. Statistically significant differences have been observed for calf, subscapular and triceps skinfold, while the suprailiac skinfold exhibits non-significant difference.

Results obtained after calculating the Body Mass Index (BMI), abdominal/hip ratio and shoulder/ hip ratio are presented in Table 4. The mean values again are higher for Banias and except for shoulder/ hip ratio both other two indices show statistically significant differences.

## DISCUSSION

External morphology is chosen as a subject of study as it explicits externally the morphological structure of human beings. There are variations in physique and body composition of different individuals even if they live under same ecological conditions. Human populations undergo adaptive changes in their body morphology in order to survive successfully in the environment in which they live (Eiben, 1972). Even of the fact that if two endogamous groups are sharing same ecological environment, they show variations due to preservation of their specific gene pools. The importance of genetic and environmental factors in some of the well nourished populations has been extensively studied (Livshsits, 1986; Byard et al., 1988; Sorenson, 1992).

The results of the body measurements indicate that Jat Sikh females are taller, heavier and have greater sitting height than their Bania counterparts with statistically significant differences. The variation in weight and stature shown by the two groups can be attributed to different factors including genetical, socio-economic, environmental and nutritional (Bouchard, 1994; Meyer et al., 1996; Ulijaszek, 1998).

Generally, the Bania girls have exhibited thicker fatfolds at triceps, calf, subscapular and

**Table 1: Mean, S.D. and S.E.M. of some physical parameters in Jat Sikh and Bania females of 20-25 years age group**

| | *Jat Sikh (N = 150)* | | | *Banias (N=150)* | | | |
|---|---|---|---|---|---|---|---|
| *Parameter* | *Mean* | *S.D.* | *S.E.M* | *Mean* | *S.D.* | *S.E.M.* | *t-value* |
| Stature (cm) | 159.49 | 5.37 | 0.44 | 157.08 | 5.50 | 0.45 | 3.83* |
| Sitting height (cm) | 80.48 | 3.79 | 0.31 | 76.22 | 3.74 | 0.31 | 9.73* |
| Weight (kg) | 52.17 | 4.83 | 0.39 | 51.53 | 4.88 | 0.39 | 1.16 |
| Humerus bicondylar | 5.72 | 0.34 | 0.03 | 5.58 | 0.30 | 0.02 | 3.88* |
| Femur bicondylar | 7.60 | 0.26 | 0.02 | 7.47 | 0.39 | 0.03 | 3.61* |

*P < 0.05

**Table 2: Mean, S.D. and S.E.M. of various circumferences of Jat Sikh and Bania females in 20-25 years age-group.**

| | *Jat Sikh (N = 150)* | | | *Banias (N=150)* | | | |
|---|---|---|---|---|---|---|---|
| *Parameter* | *Mean* | *S.D.* | *S.E.M* | *Mean* | *S.D.* | *S.E.M.* | *t-value* |
| Hip circumference (cm) | 91.28 | 4.56 | 0.37 | 89.19 | 5.70 | 0.46 | 3.54* |
| Shoulder circumference (cm) | 85.13 | 4.79 | 0.39 | 83.74 | 5.14 | 0.42 | 2.42* |
| Abdominal circumference (cm) | 66.34 | 3.75 | 0.31 | 66.39 | 3.47 | 0.27 | 1.12 |
| Head circumference (cm) | 53.81 | 2.74 | 0.22 | 53.51 | 1.06 | 0.09 | 1.26 |
| Calf circumference (cm) | 29.96 | 1.82 | 0.15 | 30.30 | 1.60 | 0.13 | 1.71 |
| Upper arm circumference (cm) | 22.80 | 1.94 | 0.16 | 22.55 | 1.54 | 0.13 | 1.21 |

*P < 0.05

**Table 3: Mean, S.D. and S.E.M. of various skinfolds of Jat Sikh and Bania females in 20-25 years age group**

| | *Jat Sikh (N = 150)* | | | *Banias (N=150)* | | | |
|---|---|---|---|---|---|---|---|
| *Parameter* | *Mean* | *S.D.* | *S.E.M* | *Mean* | *S.D.* | *S.E.M.* | *t-value* |
| Calf skinfold (mm) | 16.89 | 1.14 | 0.09 | 17.70 | 1.06 | 0.08 | 6.37* |
| Suprailiac skinfold (cm) | 16.59 | 2.66 | 0.22 | 17.00 | 2.88 | 0.24 | 1.26 |
| Subscapular skinfold (mm) | 15.26 | 2.68 | 0.22 | 17.05 | 2.62 | 0.21 | 5.89 |
| Triceps skinfold (mm) | 13.94 | 1.76 | 0.14 | 14.58 | 1.88 | 0.15 | 3.12* |

*P < 0.05

**Table 4: Mean, S.D. and S.E.M. of various ratios of Jat Sikh and Bania females in 20-25 years age group**

| | *Jat Sikh (N = 150)* | | | *Banias (N=150)* | | | |
|---|---|---|---|---|---|---|---|
| *Parameter* | *Mean* | *S.D.* | *S.E.M* | *Mean* | *S.D.* | *S.E.M.* | *t-value* |
| Body Mass Index | 20.47 | 1.55 | 0.13 | 20.88 | 1.68 | 0.14 | 2.15* |
| Abdominal/Hip Ratio | 0.73 | 0.04 | 0.003 | 0.74 | 0.04 | 0.003 | 2.36* |
| Shoulder/Hip Ratio | 0.93 | 0.06 | 0.005 | 0.94 | 0.06 | 0.005 | 1.41 |

*P < 0.05

suprailiac. The difference between the two groups seem to be genetical. While the Jat Sikh girls have been very active and have vigorous habitual physical activity, the Bania girls have a sedentary life style. The differential in body fat patterning may be a continuation of genetic expression perpetuated through different occupations traditionally employed by the two communities.

The Jat Sikh girls possess higher values for hip, shoulder, head and upper arm circumferences except for abdominal and calf circumferences though the differences for these two are statistically non-significant. Larger circumferences in Jat Sikh girls can be attributed to better dietary habits adopted by them. The pattern of circumference also corresponds to the general development of the skeletal system (Frisancho, 1990; Eveleth and Tanner, 1990).

Skeletal diameters are mainly used as indicators of frame, size and skeletal mass (Frisancho, 1984; Himes and Bouchard, 1985). The physique of Jat Sikh girls is such that they possess greater development of musculo-skeletal structures. They have relatively less adipose tissue and are more lean. They are also more sturdy and muscular than their Bania counterparts. The sexual dimorphism in adult morphology are indicators of selectively greater development of shoulder circumference in males and hip circumference in females. In the present study the shoulder circumference to hip circumference ratio has been studied in the two endogamous groups of Punjab i.e. the Jat Sikh and the Bania. Out of these two, the Banias show greater value of this ratio as compared to Jat Sikhs, the values being 0.94 and 0.93 respectively, though the differences are statistically non-significant. The waist circumference is an indicator of the centripetal pattern of distribution of the subcutaneous adipose tissue. The value is greater in case of Banias (0.74) as compared to the Jat Sikhs (0.73), the difference being statistically significant. The greater deposition of subcutaneous adipose tissue can be attributed to greater consumption of fatty products by Banias coupled with lesser habitual physical activity. Since the Jat Sikhs lead a strenuous habitual physical life, there is a lot of burning of calories thus resulting in lesser deposition of fats. Today 0.7 is taken as the ideal waist to hip ratio for super model physique. Girls of the present study have values of 0.73 and 0.74 for Jat Sikh and Bania respectively. The values clearly implicates that today girls are becoming more and more conscious about their physique and body proportion as compared to the girls of earlier generations. This consciousness about physique among the females of today can be credited to greater projection by mass media highlighted in beauty contests and fashion shows.

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