SOMATOTYPIC VARIATIONS IN PUNJABI URBAN AND RURAL WOMEN/ SOMATOTYPIC VARIATIONS AMONG ELDERLY WOMEN OF PUNJAB

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Abstract

Somatotype variations among elderly urban and rural women of Punjab have been investigated. A cross-sectional sample of 600 subjects (300 each group) ranging in age from 50-80 years, was measured from April, 2010 to April, 2012 from different areas of Punjab. The Heath- Carter anthropometric somatotype (1967) for different age groups is 6.75-4.41-0.62 (50-55 years), 8.23-4.71-0.88 (56-60 years), 6.16-4.12-0.91 (61-65 years), 6.414-4.06-0.82 (66-70 years), 5.28-3.09-1.37 (71-75 years) and 5.41-3.18-1.17 (76-80 years) for urban women and 6.60-4.23-1.09 (50-55 years), 6.59-4.12-1.04 (56-60 years), 5.9-3.24-1.77 (61-65 years), 5.46-3.62-1.43 (66-70 years), 5.55-3.08-1.35 (71-75 years), 5.92-3.13-0.99 (76-80 years). Thus pointing that all urban and rural women are endomorphic having maximum endomorphic value 8.23 (56-60 years) in urban and 6.60 (50-55 years) in rural women. Physique of both urban and rural women of age group 56-60 years is more diverse as reflected by higher value of SDM (7.41±4.26 and 6.37±3.30 respectively). Inter group differences for ectomorphy component are found to be relatively more than those for endomorphy and mesomorphy components of somatotype.

Keywords: Somatotype, Somatotype dispersion mean, Somatotype attitudinal mean, Endomorphy, Ectomorphy, Mesomorphy

Introduction

Visual appraisal has been often used to describe individuals as thin (ectomorphic), muscular (mesomorphic) and fatty (endomorphic). All these variations in the human body dimensions are caused and affected by various ecological, biological, geographical, racial, gender and age factors (Mibodi and Frahani, 1996 and Okupe et al., 1984).To study these variations, somatotyping is a well-established and excellent tool. It describes the physical characteristics of the human body and allows a definition of body type through the analysis of metric characters (Carter and Heath, 1990; Heath and Carter, 1967). It combines an appraisal of relative adiposity, musculo-skeletal robustness and linearity into three number rating: Endomorphy, Mesomorphy and Ectomorphy.

Apparent somatotypic differences that are observed may have their expression and incidence considerably variable within and between the groups of elderly people of similar or dissimilar genetic backgrounds.Changes in the patterns of growth and maturation have been associated to the urbanization of settlements, along with an improvement of public hygiene and education and a social rest ratification of family life (Bodzsár and Susanne, 1998). However, also psychic stress has increased; the rhythm of everyday life has become faster and is accompanied by changes in the customary style of life. Of the changes diminishing habitual exercise and a more sedentary style of leisure time activity are the most characteristic ones. Progressing sedentary behavior obviously means reduced energy expenditure. Missing regular exercise in childhood and adolescence affects unfavorably, not merely the existing health status and mental/ physical capacity of performance, but increases the risks of chronic adult diseases as well (Due et al., 2001). The activity performance and the mean level of energy expenditure from physical activities in females and males have a significant influence on their life expectancies also (Rougerie and Courtois, 1997).

Use of somatotype to study different populations has both heuristic and applied importance. It has clinical applications in relation to nutritional status, health conditions in elderly population (Malina, 1997 and Bolonchuck et al., 2000).Present study has been conducted with a view to highlight the somatotypic variations in elderly women of Punjab.

Material and Method

The present cross-sectional study was conducted on 600 healthy urban and rural house wives (300 each group) ranging in age from 50 to 80 years, of Punjab state including Amritsar, Bathinda, Faridkot, Ferozepur, Ludhiana, Moga, Patiala and Sri Mukatsar Sahib Districts.

Subjects were divided into six age groups (50-55 years; 56-60 years; 61-65 years; 66-70 years; 71-75 years; 76-80 years). Various anthropometric measurements were taken on the right side of each subject by following the methodology of Lohman et al. (1988).Sampling was done during April, 2010 to April, 2012.All the procedures and protocol were approved by Institutional clinical ethical committee (ICEC) of Punjabi university, Patiala.

All the three primary components of physique were calculated using equations given by Carter (1980).Somatotype dispersion mean (SDM), somatotype attitudinal mean (SAM) and somatotype differences between urban and rural women for three somatotype components are also calculated by using Ross and Wilson (1973, 1974) formulae.

Results:

The descriptive statistics of the somatotypes in overall sample are given in Table 1.The mean somatotype of the Punjabi urban and rural women is 6.75-4.41-0.62 (50-55 years), 8.23-4.71-0.88 (56-60 years), 6.16-4.12-0.91 (61-65 years), 6.414-4.06-0.82 (66-70 years),

5.28-3.09-1.37 (71-75 years) and 5.41-3.18-1.17 (76-80 years) and 6.60-4.23-1.09 (50-55 years), 6.59-4.12-1.04 (56-60 years), 5.9-3.24-1.77 (61-65 years), 5.46-3.62-1.43 (66-70 years), 5.55-3.08-1.35 (71-75 years), 5.92-3.13-0.99 (76-80 years) respectively. The distribution of the values shows that maximum value of endomorphy and mesomorphy is observed in the age group of 56-60 years (8.23-4.71) in urban and 50-55 years (6.60-4.23) in rural women. Maximum ectomorphic value is observed at the age group of 71-75 years (1.37) in urban and at the age group of 61-65 years (1.77) in rural women. Mean somato charts (Figure 1 and 2) showed that both urban and rural women are endomorphic but the value of endomorphic component is higher in urban women than the rural women at first four age groups thus suggesting the greater development of non-essential fat in their body build.Trends in mesomorphy shows that urban women are more mesomorphic at all the age groups than rural women.

The differences of the first component of somatotype (Endomorphy) are found to be statistically significant among 56-60 years, 66-70 years and 76-80 years of the age groups. Urban women have significantly higher mesomorphy at 61-65 years of the age group and rural women possess significantly higher ectomorphy component at the first four age groups than urban women (Table 2).

Somatotype distributions (Table 3) provide the information about the magnitude of dispersion or scatter of somatotypes about their mean values. Somatotype Dispersion Mean (SDM) is the average of the distance in two dimensions and somatotype attitudinal mean (SAM) in three dimensions, between any two somatoplots. The mean values of SDM for urban women are 6.54, 7.41, 5.71, 6.06, 4.77, 4.58 for all the age groups from 50-55 years till 76-80 years. 56-60 years of the age group possess maximum value for SDM among all the age groups of urban women. Similarly mean SDM values among rural women across all the age groups are 6.23, 6.37, 5.21, 5.02, 5.39, 4.72 having maximum value for 56-60 years of the age group. In case of somatotype attitudinal mean values lie in the range of 1.92 to 3.32 among urban women and 1.98 to 2.76 among rural women. However, maximum dispersion of somatotypes about their mean value has been observed in 56-60 years of the age group in both urban and rural women.

	Age Group (Years)		50-55	56-60	61-65	66-70	71-75	76-80
URBAN WOMEN	Endomorphy	Mean	6.75	8.23	6.16	6.14	5.28	5.41
		SD	1.26	1.64	1.43	1.44	1.25	0.99
		SEM	0.17	0.23	0.20	0.20	0.17	0.14
	Mesomorphy	Mean	4.41	4.71	4.12	4.06	3.09	3.18
		SD	1.71	2.13	1.59	1.93	1.66	1.20
		SEM	0.24	0.30	0.22	0.27	0.23	0.17
	Ectomorphy	Mean	0.62	0.88	0.91	0.82	1.37	1.17
		SD	0.73	1.01	1.30	1.15	1.27	0.95
		SEM	0.10	0.14	0.18	0.16	0.18	0.13
RURAL WOMEN	Endomorphy	Mean	6.60	6.59	5.9	5.46	5.55	5.92
		SD	1.13	1.04	1.46	1.45	1.04	0.98
		SEM	0.16	0.14	0.20	0.20	0.14	0.13
	Mesomorphy	Mean	4.23	4.12	3.24	3.62	3.08	3.13
		SD	1.95	1.82	1.72	1.27	1.05	1.13
		SEM	0.27	0.25	0.24	0.18	0.14	0.16
	Ectomorphy	Mean	1.09	1.04	1.77	1.43	1.35	0.99
		SD	1.08	0.99	1.55	1.18	1.12	1.15
		SEM	0.15	0.14	0.21	0.16	0.15	0.16

Table 1: Somatotype components of urban and rural women

Age Group (Years)	50-55	56-60	61-65	66-70	71-75	76-80
Endomorphy	0.65	6.30***	0.92	2.42*	1.22	2.68**
Mesomorphy	0.50	1.51	2.75**	1.37	0.03	0.21
Ectomorphy	2.61**	8.40***	3.18**	2.77**	0.08	0.90

*p<0.05, **p<0.01, ***p<0.001

Table 2: Statistical difference (t-values) for somatotype components between urban and rural women Table 3: Somatotype distribution in urban and rural women

	Age Group (Years)		50-55	56-60	61-65	66-70	71-75	76-80
URBAN WOMEN	Somatotype Dispersion Mean	Mean	6.54	7.41	5.71	6.06	4.77	4.58
		SD	3.63	4.26	3.26	3.51	2.67	2.61
		SEM	0.51	0.60	0.46	0.49	0.37	0.37
	Somatotype Attitudinal Mean	Mean	2.81	3.32	2.44	2.59	2.02	1.92
		SD	1.56	1.92	1.38	1.50	1.13	1.09
		SEM	0.22	0.27	0.19	0.21	0.16	0.15
RURAL WOMEN	Somatotype Dispersion Mean	Mean	6.23	6.37	5.21	5.02	5.39	4.72
		SD	3.33	3.30	2.70	2.59	3.05	2.71
		SEM	0.47	0.46	0.38	0.36	0.42	0.38
	Somatotype Attitudinal Mean	Mean	2.69	2.76	2.22	2.13	2.26	1.98
		SD	1.45	1.42	1.16	1.10	1.28	1.13
		SEM	0.20	0.20	0.16	0.15	0.18	0.16

Table 3: Somatotype distribution in urban and rural women

Singal and Sidhu (1984)				Present Study			
Age groups (yrs)	Bania Females			Age groups (yrs)	Urban Women		
	Endomorphy	Mesomorphy	Ectomorphy		Endomorphy	Mesomorphy	Ectomorphy
50-54	7.42	4.14	1.80	50-55	6.75	4.41	0.62
55-59	7.19	4.09	1.37	56-60	8.23	4.71	0.88
60-64	7.26	4.19	1.65	61-65	6.16	4.12	0.91
65-69	6.74	3.98	1.70	66-70	6.14	4.06	0.82
70+	5.72	3.74	1.96	71-75	5.28	3.09	1.37

Table 4: Comparative analysis of somatotype components of bania females of Singal and Sidhu (1984) with urban women of present study

Singal and Sidhu (1984)					Present Study		
Age groups (yrs)	Jat sikh Females			Age groups (yrs)	Rural women		
	Endomorphy	Mesomorphy	Ectomorphy		Endomorphy	Mesomorphy	Ectomorphy
50-54	6.09	3.50	2.50	50-55	6.60	4.23	1.09
55-59	6.30	3.66	2.47	56-60	6.59	4.12	1.04
60-64	6.85	3.77	2.00	61-65	5.90	3.24	1.77
65-69	6.20	3.52	2.42	66-70	5.46	3.62	1.43
70+	5.31	3.37	2.77	71-75	5.55	3.08	1.35

Table 5: Comparative analysis of somatotype components of jat sikh females of Singal and Sidhu (1984) with rural women of present study

SOMATOCHARTS

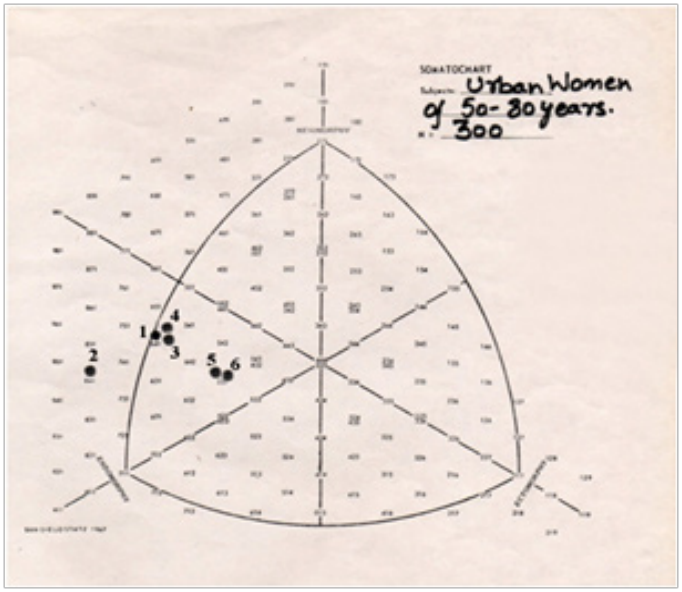

Figure:1

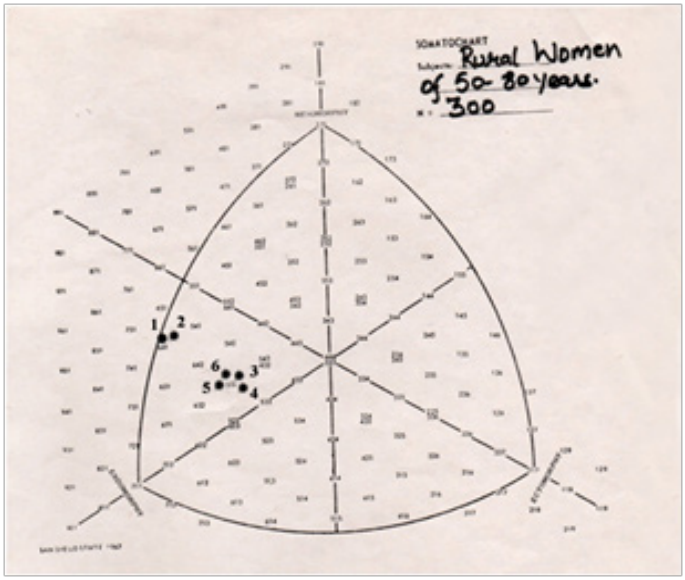

Figure :2

Figure 1: Mean Somatochart of 50 – 80 years of urban women. Figure 2: Mean Somatochart of 50 – 80 years of rural women
(1 = 50-55 yrs; 2 = 56-60 yrs; 3 = 61-65 yrs; 4 = 66-70 yrs; 5 = 71-75 yrs; 6 = 76-80 yrs)

Discussion:

There is little information about the somatotypes in elderly. However previous studies agree about the dominance of endo- and mesomorphic components and the low development of ectomorphy with respect to younger age groups (Bailey et al., 1982; Bufa et al., 2005; Gaur and Singh, 1997; Singal and Sidhu, 1984). Our results are consistent with those studies.

Dominance of endomorphic component in both the urban and rural women may be attributed to their sedentary life styles and lower energy expenditure. Significantly more predominance of endomorphic component in urban women of the age group of 56-60 years and 66-70 years might be due to their dietary habits, social status such that keeping maids at their homes for their daily house routines and more over they live in the polluted environment of cities under various life stresses. The rural females living in rural areas are adapted to a physically strenuous type of life. Apart from their household duties they also help their spouses in their routine work. Kumar et al. (1997) also reported that sedentary activities generally have little higher endomorphic values than for the persons involved in heavy and hard physical labor. Habitual physical activity plays a significant role in restricting the endomorphic component to a certain extent.

Compared with reference populations (Table 4, 5), urban women are less endomorphic than the Bania females except at the age group of 56-60 years where urban are more endomorphic (Singal and Sidhu, 1984) whereas rural women are more endomorphic at the age groups of 50-55 years, 56-60 years and 71-75 years only and at the other age groups jat sikh females are more endomorphic. Many studies had shown that somatotype ratings change with the age and physical activity in Indian populations too (Parizkova & Carter, 1976; Sodhi, 1976; Singh & Sidhu, 1980). The present study also shows that the somatotype ratings continue to change after 50 years of age.

Genetic and environmental factors also influence the somatotype of the individual. Various studies have highlighted the effects of environment and genetical factors on somatotype (Bouchard, 1977; Bouchard et al., 1980). Katzmarzyk et al. (2000) revealed specific familial resemblance for physique and heritabilities for somatotype components. Significant role of genetic factors and familial resemblance has been observed in explaining variations in body physique. Heritabilities component for endomorphy, mesomorphy and ectomorphy were 56%, 68% and 56% respectively.

Somatotype studies from around the world reflect extensive variations suggesting differences due to genetics (Singhand Singh, 2000), sex (Tanner, 1962; Parizkova andCarter, 1976), nutrition (Malik et al., 1986), physical activity (Carter, 1970;Parizkova, 1970) and ageing (Zuk, 1958; Walker, 1978).

Conclusion

The present study has shown that anthropometric somatotype can be effectively applied to the study of aging, finding difference in different groups, their nutritional status, physical activities. Urban and rural women of all the age groups dominate in endomorphy in comparison to its sister components. Endomorphy and mesomorphy components of somatotype decrease with age in both urban and rural women. This study opens the way to further investigations.

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