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Trends in somatotype components of ageing rural women of Punjab.

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ABSTRACT:

The purpose of this study was to determine somatotypic variations in rural women of Punjab. The study sample consisted of 300 healthy rural house wives between 50-80 years, subdivided into six age groups.Somatotypes were computed according to the equation given by Carter (1980). The results show a dominance of endomorphic component over the other two somatotype components, having maximum endomorphic values for women in the age group of 50-55 years (6.60). Minimum and maximum ectomorphic values were observed at the age group of 76-80 years (0.99) and 61-65 years (1.77) respectively. Minimum mesomorphic values are at the age group of 71-75 years i.e. 3.08. A maximum mesomorphic value is observed at the age group of 50-55 years (4.23). Ectomorphic component decreases with age till 66-70 years of age group and then increases. Ectomorphic and mesomorphic components show a regular trend of declination except at the age groups of 61-65 years and 66-70 years, 76-80 years of age groups respectively. Maximum scattering of individual somatotype was found in 56-60 years of age group as indicated by maximum values of SDM and SAM.

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

INTRODUCTION:

The human physique is a continuously variable characteristic which was explained by Sheldon et al. (1940), who successfully devised a method to analyse and quantify human body form called Somatotyping. Later on it was modified by Heath and Carter (1967) on the basis of body measurements to make it more workable. Variations in the human body physique have always been an important topic of interest in the human population studies because of its applications in sports, health and disease (Singh 2007). Visual appraisal has been often used to describe individuals as thin (ectomorphic), muscular (mesomorphic) and fatty (endomorphic). Ecological, biological, geographical, racial, gender and age factors affect and cause variations in the human body dimensions (Tuli et al., 1995; Mibodi and Frahani, 1996 and Okupe et al., 1984). To understand these variations, WHO (1995) formulated the universally applicable, non-invasive and inexpensive method of "Anthropometry" and recommended its use. According to Lohman et al. (1988) population variation occurs primarily in proportions and fat patterning as reflected through anthropometric dimensions**.** Various anatomical and physiological changes have been observed in body tissues during aging and even found to be modified by environmental stresses. The state of the tissues especially the stiffness and the incorporation of genetic errors with advancing age is a pointer toward the process of ageing and deterioration in the overall physical performance of the individual. Differences in body build and composition along with specific adaptations to environmental conditions are the hallmarks of survival and well being (Boyd 1980) and hence should be investigated.

Morphometric and body build variations in any population can be studied by somatotyping (Carter and Heath 1990). It gives the best picture about the human physique. Gaur and Singh (1997) and Bhasin and Jain (2007) have summarized the information regarding age related changes in somatotype in the life span development and reflecting the dynamics of human physique. A somatotype study by Kaur (2009) found that urban Brahmin females (6.05-4.131.33) are more endomorphic and mesomorphic, but less ectomorphic than their rural counterparts (5.69-3.74-1.76) thus establishing population differences.

Though some studies are available on somatotype from within the region but these are either on growing children or on young adults (Singh 2007, Singh et al.1980, 1987, 1988, Chandel and Malik 2012) thus leaving a void in information on ageing population to be filled by new

studies. The present study is an attempt to fill that gap in information by studying age related variations of somatotype in a cross-sectional sample of 300 healthy rural women of Punjab.

MATERIAL AND METHOD:

The present cross-sectional study was conducted on 300 rural house wives 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 including height, weight, diameters of humerus and femur, circumferences of calf and upper arm, skinfolds at triceps, subscapular and surailiac were taken on right side of each subject by following the methodology of Lohman et al. (1988). All the procedures and protocol were approved by Institutional clinical ethical committee (ICEC) of Punjabi university, Patiala. The three primary components of physique were calculated using equations given by Carter (1980). Somatotype distribution was also considered.

RESULTS:

Table 1, Figure 1 represents the trend of somatotype components i.e. endomorphy, mesomorphy and ectomorphy in rural women of Punjab. There is a clear trend of decrease in the value of endomorphy from 50-55 yr to 66-70 yr and a slight increase in it thereafter. Maximum value of endomorphy is observed in the age group of 50-55 years (6.60). Mesomorphy rating which is an indicator of musculo-skeletal development decreases at every successive age pointing to muscular loss. Minimum mesomorphic value is observed at the age group of 71-75 years i.e. 3.08. A maximum mesomorphic value is observed at the age group of 50-55 years (4.23). Ectomorphy increases up to the age of 61-65 yr and then it decreases. Minimum ectomorphic value is observed at the age group of 76-80 years (0.99) and maximum at 61-65 years (1.77).

Somatotype distributions provide the information about the magnitude of dispersion or scatter of somatotypes about their mean values. Ross and Wilson (1973, 1974) presented formulae to calculate the distance between any two somatoplots and the dispersion around the mean somatoplot in two and three dimensions. 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 among rural women across all the age groups are 6.23, 6.37, 5.21, 5.02, 5.39, 4.72 having a maximum value for 56-60 years of the age group (Table 2). In case

of somatotype attitudinal mean values lie in the range of 1.98 to 2.76. However, maximum dispersion of somatotypes about their mean value has been observed in 56-60 years of the age group. Tables 3 and 4 show the comparison of somatotype components of rural women of present study and Jat Sikh females of Singal and Sidhu, (1984). The differences for ectomorphy are statistically significant among all the age groups except at the age group of 61-65 years, where the differences are non-significant. The rural women of the present study show significantly lower values of ectomorphy component which means they are more massive. For endomorphy and mesomorphy, statistically significant differences are found only at the age groups of 61-65 years and 50-55 years respectively which means that the two populations have almost similar endomorphy and mesomorphy ratings.

DISCUSSION:

There is a clear trend of decrease in the value of endomorphy in rural women of Punjab from 50-55 yr to 66-70 yr and a slight increase in it thereafter. Endomorphy is in fact a reflection of the total body fat. Why does the amount of fat decrease in rural women with advancing age? Perhaps after the menopause there is not only a redistribution of body fat but slow loss of fat as well as the age advances. The findings of Svendsen et al. (1995) were different from those of our study who observed that in healthy women total body fat may increase after menopause. However, it was not clear whether it was only shortly after menopause or long time thereafter. Hormones play an important role in all phases of life in redistributing the body fat and clearly individual differences in the amount of these hormones play very crucial role in body fat outcome. In a study on men by Vermeulen et al. (1999) aged 70-80 years, it was found that the testosterone hormone levels were important determinants of body fat, the greater the levels of the hormone the lesser was the amount of body fat. Consequently, the more amounts of lean body mass these men had.

Endomorphy dominates over mesomorphy and ectomorphy in the present study. Mean values of all the somatotypes lie within the meso-endomorphic sector of the somatochart highlighting an overemphasis of endomorphy component over the other two. Higher values of endomorphy indicate a predominance of body fat, which may be due to their life style and dietary habits. According to Bailey et al. (1982) at ages over and under 40 years, obese and diabetic females were significantly more endomorphic.

Mesomorphy rating which is an indicator of musculo-skeletal tissues decrease at every successive age in rural women of Punjab pointing to muscular loss. Harris (1997) studied the amounts of muscle mass among the elderly and found out that not only does the muscle mass decrease but the muscular strength also decreases proportionately.

Many studies have shown that somatotype ratings change with age and physical activity. The greater the physical activity the more amounts of muscle mass and mesomorphy (Parizkova and Carter, 1976; Sodhi, 1976; Singh and Sidhu, 1980). Genetic and environmental factors also influence the somatotype of an individual. Various studies have highlighted the effects of environment and genetical factors on somatotype (Bouchard, 1977; Bouchard et al., 1980; Peters et al., 2003). 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. Heritability component for endomorphy, mesomorphy and ectomorphy were found out to be 56%, 68% and 56%, respectively. A comparative picture with another population of Jat Sikh women (Singal and Sidhu 1984) living in the same area found that the present population show relatively lower values of ectomorphy. Since other factors remaining the same, the differential nutritional and physical activity regimes of the two groups seem to be the reason behind it.

It can be concluded from the present study that rural women show a dominance of endomorphy over mesomorphy and ectomorphy at all the age groups. Endomorphy and mesomorphy components of somatotype generally decrease with age indicating less fat and muscles with advancing age. This leads to fragility and weakness of muscles and a generally shrinking body size and build which needs to be taken care of in order to decrease the chances of injury and falls..

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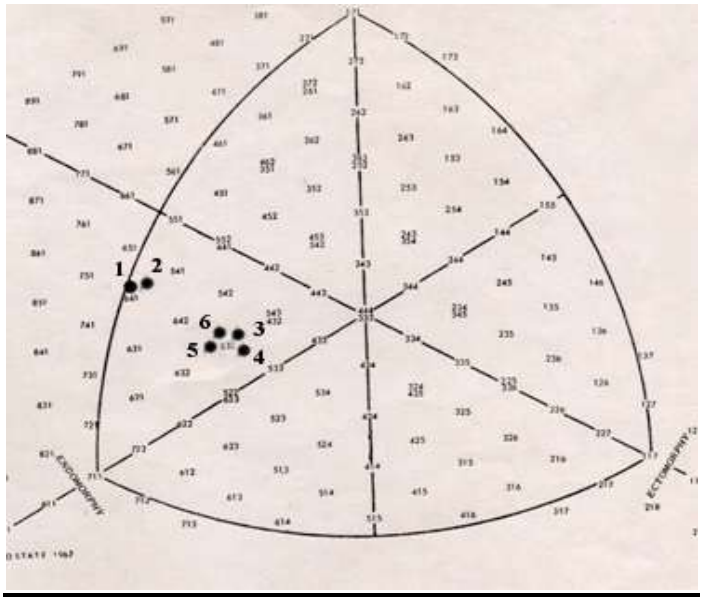
Table 1: Somatotype components of rural women with age

Age Group (Years)		50-55	56-60	61-65	66-70	71-75	76-80
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 2: Somatotype distribution in rural women with age

Age Group (Years)		50-55	56-60	61-65	66-70	71-75	76-80
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



(1 = 50-55 yrs; 2 = 56-60 yrs; 3 = 61-65 yrs; 4 = 66-70 yrs; 5 = 71-75 yrs; 6 = 76-80 yrs)

Figure 1: Mean Somatochart of 50 – 80 years of rural women

Table 3: Comparative analysis of somatotype components of Jat Sikh females (Singal and Sidhu 1984) with rural women of present study

Singal and Sidhu (1984)				**Present Study**			
Age groups (yrs)	**Jatsikh Females**			**Age groups (yrs)**	**Rural Women**		
	Endomorphy	**Meso morphy**	**Ecto morphy**		**Endo morphy**	**Meso morphy**	**Ecto morphy**
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 4: Statistical differences (t-values) for somatotype components of Jat Sikh females (Singal and Sidhu 1984) and rural women of present study

Age Groups (yr)	50-55	56-60	61-65	66-70	71-75
Endomorphy	1.59	0.90	2.15*	1.94	0.64
Mesomorphy	2.43*	1.52	1.59	0.37	1.51
Ectomorphy	4.98***	4.61***	0.63	3.19**	4.34***

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