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Anthropometric Characteristics and Somatotype of Bengali Women Migrated from Bangladesh and Living in the Slum Areas near Railway Tracks in West Bengal

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ABSTRACT

Sixty-four Bengali women, migrated from Bangladesh were studied for their anthropometric characteristics including somatotype. The studied women were with an average age of 44.4±4.0 yr (range 35-52 yr). Average height was 150.2 ± 3.97 cm (137.9-156.3). Average somatotype of the migrated Bengali women was 5.1 (± 0.8) - 2.8 (± 0.7) - 0.5 ± (0.4). Heath-Carter method (1967) was used for calculating somatotype. High endomorphic component was also reflected in high average body fat % which was 28.4 (±3.3) % in average. Thus, the migrated Bengali women were Mesomorphic endomorph with a low muscle mass and relatively high body fat. The muscularity component was low whereas the endomorphic component showed moderate to high. The low muscularity with high fattiness were might be due to poor socio-economic status which deprived them from having sufficient protein intake and dependent on more carbohydrate intake. More studies were required for a final comment.

INTRODUCTION:

Somatotype can be defined as present morphological state of the individual. More precisely, Somatotype is the quantification of human body shape and size from 0.5 to 12 + points. Somatotype classify the human body into three basic components, Endomorph, Mesomoprh and Ectomorph (Carter and Heath 1990). Endomorph represents the fattiness, mesomorph represents the muscularity and ectomorph represents the linearity of a person. Each component is quantified from 0.5 to 12+. The endomorph body type is characterized by rounded physique, large number of fat cells, and larger waist circumference than the chest, large head, broad face and short neck. The endomorphic people have a great potential for building muscle mass but the difficulty in losing fat. Low physical activity can lead to the risk of obesity and heart disease (Carter and Heath 1990). Mesomorphic physique is a muscular body type with a strong skeleton, broad shoulders and chest, firm limbs, massive pelvis and a very fast muscle growth (Carter and Heath 1990). The ectomorph body type is characterized by slim physique, lean muscles, leaning arms, relatively short torso and long limbs. This body type is characterized by rapid energy expenditure, less body fat, and as well as slow muscle growth (Carter and Heath 1990). The expression of somatotypes is a mixture of three components: Endomorphs, Mesomorph and Ectomorph and present in a three-digit form. An individual who has only endomorphic features has the assigned symbol 9-1-1, while a person with only mesomorphic characteristics 1-9-1 and ectomorphic one 1-1-9 (Carter and Heath 1990). The relationship between somatotype and the risk and incidence of diseases was the subject of numerous studies. Studies show that people with endomorphy somatotype have a higher risk of: diabetes mellitus (Yeung 2010), hypertension (William *et al.* 2000, Badenhorst *et al.* 2003, Herrera *et al.* 2004), metabolic syndrome (Martinez *et al.* 2012; Galic *et al.* 2016) and cancer (Bertrand 2013). As there were no study on somatotype of Bengali women, the present study was designed to find out the somatotype of migrated Bengali women for future reference.

MATERIALS AND METHODS

Subjects: 64 Bengali Bangladeshi migrated women were measured randomly from the slums built near the railway track run between Dumdum Cant railway station and Durganagor railway station in north 24 paraganas district of West Bengal. All the families from where women were measured migrated from Bangladesh and living in India for the last few years only. The population is mixed from Hindu and Muslim communities.

Anthropometrical measurements: Anthropometric measurements were measured on a same day for each player in same session to avoid Technical Error of Measurement (TEM) with an accredited anthropometrist, accredited by International Society for the Advancement of Kinanthropometry (ISAK). Method described in the International Society for The Advancement of Kinanthropometry manual (ISAK 2011) was followed. Stature was measured with an Anthropometric Rod (GPS) up to 1 mm and body mass was measured with an electronic weighing machine. Skinfold thickness were measured with a Harpenden Skinfold caliper (Bety, UK). Anthropometric tape (CESCORF) was used for measuring girth while sliding caliper (CESCORF) was used to measure bone diameter.

Somatotype:

Heath - Carter (1967) method was followed for somatotype rating. The following equations were used for calculating somatotype:.

Endomorphy = ─ 0.7182 + 0.1451 × ΣSF ─ 0.00068 × ΣSF2 + 0.0000014 × ΣSF3

where ΣSF = (sum of triceps, subscapular and supraspinale skinfolds) multiplied by (170.18/height in cm). This was called height-corrected endomorphy and was preferred method for calculating endomorphy).

Mesomorphy = 0.858 × humerus breadth + 0.601 × femur breadth + 0.188 × corrected arm girth + 0.161 × corrected calf girth ─ height × 0.131 + 4.5

Three different equations were used to calculate ectomorphy according to the Height -Weight Ratio (HWR):

If HWR was greater than or equal to 40.75 then, Ectomorphy = 0.732 × HWR ─ 28.58

If HWR was less than 40.75 and greater than 38.25 then, Ectomorphy = 0.463 × HWR ─ 17.63

If HWR was equal to or less than 38.25 then, Ectomorphy = 0.1

Body Fat %: Body Fat % was calculated using the equation of Siri (1956).

Durnin and Womersley (1974) technique was followed for Body density.

Body Fat% = (495/Body density) — 450.

Body density = 1.1423-0.0632 log (Biceps +Triceps+ Subscapular + Supraspinale) for 30-39yr female

Body density = 1.333-0.0612 log (Biceps +Triceps+ Subscapular + Supraspinale) for 40-49 yr female

Body density = 1.1339-0.0645 log (Biceps +Triceps+ Subscapular + Supraspinale) for 50 yr and above female.

RESULT:

Table 1: Physical characteristics, Body Fat % and Somatotype of Bengali women in average

	Age (yr)	Height (cm)	Weight (kg)	Fat %	Somatotype		
					Endomorph	Mesomorph	Ectomorph
mean	44.4	150.2	58.9	28.4	5.1	2.8	0.5
SD	4.0	3.97	6.43	3.3	0.8	0.7	0.4
min	35	137.9	43	20.2	3.42	1.3	0.1
max	52	156.3	74	35.3	6.9	4.4	1.7

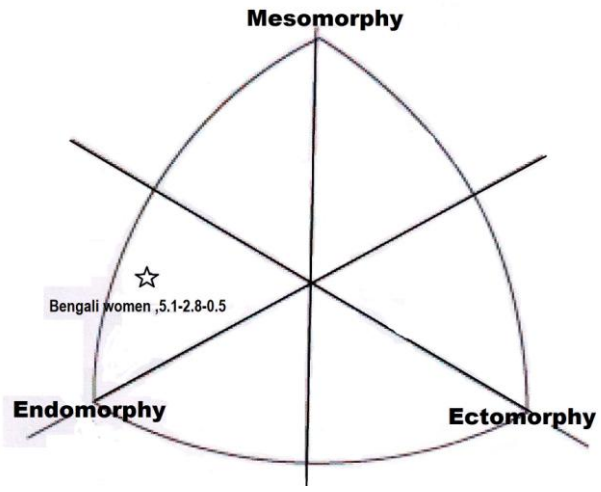

Fig 1: Mean somatotype of Bengali women from slum area. Average somatotype was 5.1-2.8-0.5 where Endomorph component was 5.1, Mesomorph component was 2.8 and Ectomorph component was 0.5

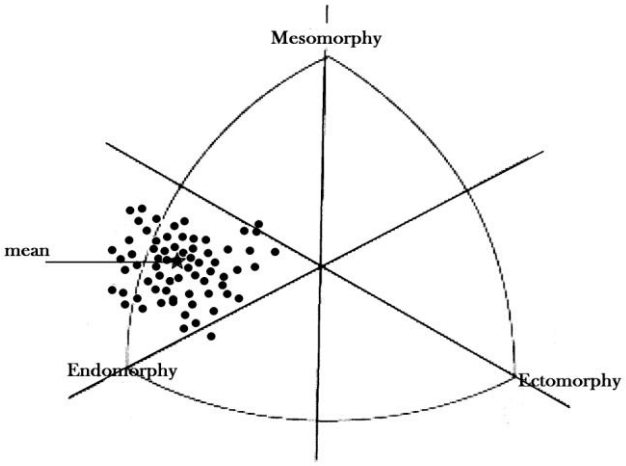

Fig 2: Somatotype of 64 Bengali women individually. All of them were in Endomorph zone with less muscularity.

DISCUSSION:

The interest in body type or physique of individuals and populations had a long history going back to the ancient Greeks. Various systems of classifying physique had been proposed over centuries, leading to the system called somatotyping as proposed by Sheldon (1940). Sheldon believed that somatotype was a fixed or genetic entity, but the present view is that somatotype is phenotypical and thus amenable to change under the influence of growth, aging, exercise and nutrition (Carter and Heath 1990).

In the present study, the women were from poor socio-economic status. All of them migrated to India from Bangladesh for better life especially for better food. All of them also born and bought up in poor or lower middle economic class back to their own country. The women of the present study was 44.4 (±4) year old in average with a range of 35-52 yr. The average height of the Bengali women in the present study was 150.2 ±3.97 cm with an average weight of 58.9 ±6.43 kg. The range for height was 137.9 to 156.3 cm and that of weight was 43 to 74 kg. Average height of the present study was very similar with 150.5 ±5.4 cm the height of women of West Bengal of similar age group (Mamidi *et al.* 2011). Bangladeshi women of 31.15 (±9.29) average age had very similar height of 150.51 (±5.44) cm studied by Hossain *et al* (2012) on Bangladeshi women of Bangladesh. When body weight was considered, the studied women were heavier than the Bangladeshi women studied by Hossain et al (2012) though the age range was different. Hossain *et al*. (2012) reported an average body weight of

47.34 (±9.2) kg for a sample of 10115, which was less than the average 58.9 ± 6.43 kg of the present study.

Bengali women of the present possessed an average somatotype of 5.1 (±3.42) -2.8 (±0.7)-0.5 (±0.4) which could be categorized by mesomorphic endomorph body type. Average mesomorph component was 2.8 (± 0.7) which was low according to the classification Carter (1990). 62.5 % women were with low muscularity, whereas only 37.5 % possessed moderate muscularity. The range was from 1.3 to 4.4 for mesomorph component (Table 1). When Endomorph component was considered, 50 % women were with moderate category and 50 % were in high category according to the classification of carter (1990). The range was in between 3.4 to 6.9. The moderate and high endomorph component were reflected in high body fat % which was 28.4(±3.3) % in average (Table 1). Once the individual values were plotted on somatochart, all women fall in mesomorphic endomorph zone (Fig 1 and Fig 2). Due to unavailability of scientific published data, comparison could not be done. The moderate and high endomorph component were reflected in high body fat % which was 28.4 (±3.3) % in average (Table 1).

Thus, from the above discussion, it could be concluded that the body type of Bengali women were mesomorphic endomorph. Muscularity was very low which should be increased whereas fattiness was moderate to high which should be reduced. This might be due to low protein intake with more dependent on carbohydrate intake. More study was required for further comments especially on nutrition part.

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