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A Comparative Study on Anthropometric Variables in Two Communities of West Bengal, India

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ABSTRACT A comparative study on anthropometric measurements and adiposity indices among adult (18 - 23 years) Hindu (n=100) and Muslim (n=100) females showed significant difference (p<0.001) except maximum hip circumference. The study also revealed that Hindu females had higher overall and abdominal fat deposition than Muslim females. Comparison of body mass index cut off values (WHO, 1995) revealed that among Muslim females frequency of under nutrition was higher on the other hand among Hindu females frequency of overweight was higher than Muslim.

INTRODUCTION

Anthropometry is an important tool in the study and understanding of human biological variability, including, of course, morphological variation as a universally applicable, non invasive and inexpensive methods (WHO, 1995). Population variation in anthropometric dimensions that may be ascribed to genetic differences occurs primarily in proportions and fat patterning (Lohman et al, 1988). Anthropometric data have also varied uses in public health including the assessment of nutritional status, cancer studies, as a risk factor for coronary heart disease (CHD) (Wang, 2003), type-2 diabetes and hypertension (HT). Studies also showed that growth pattern and fat content of the human body has physiological and medical importance, further more, it can influence morbidity and mortality (Durwin et al., 1974; WHO, 1995; Stevens et al., 1998). However, it is now clear that in addition to the amount of fat in the body, its topography particularly the abdominal fat depot is considered to be the most atherogenic, diabetogenic and hypertensiogenic fat depots of the human body (Bouchard et al., 1995; Kopelman, 2000*)*.The most commonly used measures of adiposity are body mass index (BMI), waist-circumference (WC), and waist-hip ratio (WHR). BMI is a measure of overall adiposity; where as WC and WHR are the measure of abdominal or central obesity. BMI is also the most commonly used measure of nutritional status and plays an important role specially for female, because the BMI status has an important relationship with birth weight of infants, lactation and infertility (WHO, 1995).

According to the 2001 census of India, the national Muslim population, excluding the state of Jammu and Kashmir numbered was over 100 million and comprised approximately 12% of the national total. The Muslim community of India is collectively with Indonesia, Pakistan and Bangladesh comprised the four largest national Islamic populations with only few exceptions in more recent years. There has been mark paucity of data on anthropometry (Begum and Choudhury, 1999) among Muslim females in India as well as to best of our knowledge; to date, no study has been reported on comparative study of anthropometric variable and adiposity indices among adult Hindu and Muslim females. The present investigation was therefore undertaken to investigate the pattern of anthropometric measurements and central adiposity in two communities of West Bengal.

SUBJECTS AND METHODS

A total of 200 randomly selected healthy female students (100 Hindu and 100 Muslim) of two undergraduate college of Kolkata and Howrah, West Bengal, India, were measured in this cross-sectional study. Apart from written consents for the study, all subjects completed a

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one page questionnaire which includes specific questions on age and ethnicity. The age ranges for both the samples were 18 to 23 years and was verified from admission registered.

All anthropometric measurements were made by trained personnel (ZK, PB and JRG) following standard techniques recommended by Lohman et al. (1988). Height and weight were measured to the nearest 0.1 cm and 0.5 kg, respectively. Circumference measurements were made to the nearest 0.1 cm, using a tape measure. Maximum waist circumference was measured at the smallest circumference of the torso, which is the level of natural waist. Maximum hip circumference measurement was made horizontally at the level of maximum extension of the buttocks posterior.

Two adiposity indices, BMI (overall adiposity) and WHR (central adiposity) were used and calculated by the following standard equation (Chumela et al., 1986; Yassin and Terry, 1991). Nutritional statuses were measured comparing with the cutoff value recommended by World Health Organization (1995) and classified in to three categories underweight (> 18.50), normal (18.50 – 25.00) and overweight (< 25.00).

Data were recorded on specially designed pretested schedule and managed in a Microsoft excel spreadsheet. All entries were double-checked for any possible error. In order to understand whether there was any significant difference in anthropometric variables and indices student t-test and chi-square test were done according to its necessity.

RESULTS

The minimum and maximum ages were similar in both the groups and the mean age of the Hindu females was 20.4 and for Muslims was 20.5. The means and standard deviation (SD) of the anthropometric variables and adiposity indices of the two groups were presented in Table 1. The results (Table 1) revealed that Hindu females had significantly higher mean values for height (p<0.01), weight (p<0.01), minimum waist circumference (p<0.01) than the Muslim females except maximum hip circumference. With regard to adiposity indices Hindu females had significantly higher mean values for both BMI (p<0.01) and WHR (p<0.01). The comparison of nutritional status was presented in Table 2. The results showed that among Muslim females the frequency of underweight (37%) was higher (p< 0.001);

Table 2: Comparison of BMI status in two communities.

BMI Category	*Hindu*	*Muslim*	*p*
Underweight	19	37	< 0.001
Normal	63	52	< 0.001
Overweight	18	11	< 0.001

where as both the frequency of normal (63%) and overweight (18%) were higher (p< 0.001) among Hindu females.

DISCUSSION

Without having any universally agreed way of measuring adiposity, BMI, WC, and WHR are the most commonly used measure of adiposity in epidemiological and clinical studies. An elevated WC and WHR is usually accepted as an indication of proportionally more abdominal tissue in abdominal region; where as an elevated BMI is usually accepted as an indication of overall adiposity.

In the present study Muslim females were shorter, lighter and had narrow waist circumference than that of Hindu females, but the mean maximum hip circumference was similar in both the group. Hindu females also showed significantly higher WHR and BMI, which indicate that Hindu females have higher overall

Table 1: Mean and standard deviation of anthropometric variables and indices in two communities.

Variable	*Mean**	*S.D.**	*Mean***	*S.D.***	*P*
Height (cm)	154.38	4.62	151.47	5.1	< 0.01
Weight(kg)	52.49	11.38	46.4	8.94	< 0.01
Minimum waist circumference (cm)	68.77	10.63	64.89	7.45	< 0.01
Maximum hip circumference (cm)	86.77	10.63	86.5	7.38	n.s.
Body mass index	22.02	4.46	19.82	4.49	< 0.01
Waist-hip ratio	0.78	0.05	0.75	0.05	< 0.01

* = Hindu. ** = Muslim. N.S. = not significant.

as well as abdominal fat deposition than Muslim females. This can also be understood by the comparison of the BMI status between the two groups, where frequency of overweight was higher among Hindu females. The nutritional status showed that among Muslim frequency of under nutrition was high (37%) and which may play an important affect on infant mortality and the limits of survival.

The present study showed that there were significant differences (except MHC) in anthropometric variable and fat patterning between these two communities and this difference may be due to the genetic factor. This is because, when measurement unreliability and age and sex of the individuals are controlled for either statistically or experimentally, than human variation in a given anthropometric trait can be accounted for by three major components i.e. environmental factor (E), genetic factor (G) and random sources of error (e) (Bouchard, 1986; Bouchard and Malina, 1983).

Furthermore, future studies among male subjects are necessary for understanding the relationship between these two ethnic groups. An understanding of ethnic difference in growth is essential to identifying the extent to which a single reference can be applied worldwide in the field of nutrition, epidemiological and clinical studies.

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