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ANTHROPOMETRIC MEASUREMENTS AND BODY COMPOSITION: RELATIONSHIP WITH BODY MASS INDEX OF YOUNG COLLEGE GOING FEMALES

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Abstract:

The study deals with the assessment of anthropometric measurements and body composition of young college going females (n=60), with mean age ranged between 21.76±1.14 to 23.45±1.63 years. Anthropometric indices were measured using standard procedures and equipments. Body composition was analyzed using bioelectrical impedance method. Subjects were classified on the basis of body mass index (BMI) [chronic energy deficient (CED), n= 17; underweight (UW), n=11; normal (N), n=21 and obese (O), n=11]. With the increase in the BMI, reduction in the height and increment in the body weight, MUAC (mid upper arm circumference), waist and hip circumference values was noticed. With exception of O subjects, none of the groups of subjects were able to meet the reference ideal body weight. BMI, body fat (BF), fat free mass (FFM) and total body water (TBW) increased with increase in the BMI. In contrast, impedance reduced with increment in the BMI. BF and FFM reflected positive correlations with body weight and waist hip ratio (WHR). BMI reflected positive relationship with basal metabolic rate (BMR), BF and FFM.

Keywords:

BMI, body composition, BMR, body fat, fat free mass.

INTRODUCTION:

Nutrition is a major determinant of health, and the resolution of many nutritional issues of public health concern requires survey data. In addition to dietary intake and hematological tests, the assessment of nutritional status requires a series of stature, weight, and other anthropometric dimensions. Anthropometry is essential to assess nutritional status (www.who.org and www.cdc.gov/nchs/data/nhanes/

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nhanes3/cdrom/nchs/.../anthro.pdf). Body composition is the term used to describe the different components that, when taken together, make up a person\'s body weight. The human body is composed of a variety of different tissue types including lean tissues (muscle, bone, and organs) that are metabolically active, and fat (adipose) tissue that is not. Body composition is the body's relative amount of fat to fat-free mass. Those with optimal body composition are typically healthier, move more easily and efficiently, and in general, feel better than those with less-than-ideal body composition. Achieving a more optimal body composition goes a long way toward improving one's quality of life and overall wellness. Accurate assessment of body composition is necessary in order to monitor obesity class, nutritional status, training outcomes, and general health. Measurements of body composition are important because a measure of weight alone cannot differentiate between the amount of fat-mass and fat-free mass present in the human body. Body composition (particularly body fat percentage) can be measured in several ways. Bioelectrical impedance analysis (BIA) is a commonly used method for estimating body composition. BIA actually determines the electrical impedance, or opposition to the flow of an electric current through body tissues which can then be used to calculate an estimate of total body water (TBW). BIA allows the determination of the fat-free mass (FFM) and fat %. Body composition evaluation should be included as a fundamental aspect of all physical fitness appraisals including health of young women for promoting leanness, not thinness; and to enhance lifetime physical and mental well-being. Obesity, particularly visceral obesity, is associated with increased risk of cardiovascular morbidity and mortality. Therefore, cardiovascular risk should be determined by evaluating visceral fat tissue not only in obese individuals but also in non-obese individuals (Berker et al., 2010). Present study was

undertaken to assess anthropometric measurements and body composition of young college going females.

MATERIAL AND METHOD:

This study deals with the assessment of body measurements and composition of young college going females. Sample Population and Sample Size: Sixty (60) young college going females (age-20-25 years) were purposively selected for the study. Classification of BMI for Asians/Indians given by WHO was not referred for this research. Instead, subjects were classified on the basis of previous categories of body mass index (BMI) proposed by WHO (2000). Data is presented in Table 1. Data Collection: Anthropometric measurements like height, body weight and circumferences-like mid upper arm (MUAC), waist and hip were recorded. Waist to hip ratio (WHR) was also calculated. Height was measured using a stadiometer and weight was recorded using platform weighing balance. All body circumferences were measured using a plastic non stretchable tape. Body composition of subjects was analyzed using BIA technique. TANITA body fat analyzer was used to record body composition parameters. Standard procedure was followed to analyze body composition. Parameters analyzed included basal metabolic rate (BMR), impedance, body fat (BF), fat free mass (FFM) and total body water (TBW). Statistical Analysis: Mean (M), standard deviation (SD), range (R) and percentage values were derived. Correlations (r) were derived using Pearson's product moment coefficient of correlation. Level of significance was tested at both 5 % and 1 % levels.

RESULT AND DISCUSSION:

Anthropometric Measurements: Table 2 presents data on height and weight of subjects classified BMI wise. With the increment in the BMI

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class, mean height of subjects was found to be reduced which was recorded as 158.12±4.43, 151.91±5.86, 151.62±6.36, and 151.73±6.20 cm for CED, UW, NW and O, respectively. Within group variations in the height of subjects were noticed, with a difference of 15, 18, 25 and 18 cm between minimum and maximum values of height of subjects respectively for CED, UW, NW and O subjects. CED and UW subjects showed higher deficits for body weight as compared to IBW with percent deficit calculated as -27.24 and -15.47, respectively. CED subjects showed significant positive correlation between weight and BMI ($r = 0.5216$, $0.01<p0.05$). Data on body circumferences and WHR of subjects are shown in Table 3. According to Collins et al. (2000), MUAC ranged between 16.0-18.5 cm indicates moderate degree of malnutrition in adults. For the present study, even though greater individual differences were noticed for MUAC among CED subjects, none of the subjects showed MUAC below 18.5 cm. Mean MUAC values were measured as 22.02±1.93, 24.34±2.37, 25.39±2.39 and 29.47±2.65 for CED, UW, N and O subjects, respectively. Lower the BMI class lower the MUAC is the observation. MUAC is considered to be an indicator of body weight. For the present study, with the exception of UW subjects, subjects from CED, N and O categories showed positive correlations between MUAC and BMI ($r = 0.6242$, $p<0.01$; 0.2061, $p>0.05$ and 0.0640, $p>0.05$, respectively). Waist circumference gives a better prediction of visceral and total fat. Waist circumference above 80 cm is considered to be dangerous (WHO, 2000). For the present study, mean waist and hip circumstance values were found to be increased with increase in BMI. Mean WHR was found to be below 0.8 for CED, UW and N subjects whereas it was recorded as 0.80 for O subjects. Normal WHR among obese subjects might be attributed to proportionally larger waist girth along with larger hip girth. Irrespective of BMI categories, waist and hip circumferences reflected positive correlation with BMI ($r = 0.0184$ to

0.2771, p>0.05). WHR reflected a very low insignificant negative correlation with BMI among CED and UW subjects (r = -0.0344 and -0.2593, p>0.05) but positive correlation among N and O subjects (r = 0.2897 and 0.2626, p>0.05). Body Composition of Subjects: Table 4 shows data on BMR, impedance, BF content, FFM and TBW of subjects. Mean BMR was recorded as 1249.88±38.50, 1267.91±42.78, 1305.43±56.92, 1448.27±61.32 kcal for CED, UW, N and O subjects, respectively. Previous studies have indicated that BMR decreases with increasing age, and that this decrease in BMR is related to a loss of FFM (including muscles) that occurs during aging (Lazzer et al., 2009). For the present study, except CED subjects, BMR showed positive correlation with age (r = 0.1788, 0.1989, and 0.1894, for UW, N and O subjects, respectively, p>0.05). BMR was positively correlated with BMI in all four categories of subjects (r = 0.1631 to 0.4235, p>0.05). Siedell et al. (1999) have indicated that variation in BMR is associated with subsequent weight gain. In contrast to BMR, impedance was found to be negatively correlated with BMI (r = -0.6260, p<0.01; -0.5675, p>0.05; -0.3968, p>0.05 and -0.8649, p<0.01 for CED, UW, N and O subjects, respectively). Mean impedance was found to be more in CED subjects and less in Obese subjects. Higher the category of BMI, higher was the BF content (11.31±3.00, 16.10±3.91, 20.26±3.47 and 31.85±2.85 kg for CED, UW, N and O subjects, respectively). BF % was found to be positively correlated with BMI (r = 0.5097, 0.01<p0.05; 0.6448, p<0.01 and 0.5127, p>0.05, respectively) and body weight (r = 0.0076, p>0.05; 0.8989, p<0.01; 0.8624, p<0.01 and 0.9642, p<0.01, respectively) in all categories of subjects. Similar to BF, FFM was also found to be increased with the increment in the BMI. Mean FFM was analyzed as 37.76±1.91, 38.19±1.79, 39.03±2.72 and 43.88±2.74 kg for CED, UW, N and O subjects, respectively. FFM also known as lean body mass is a muscle mass free of fat mass. For the present study, FFM showed more stronger

and significant relationship with body weight (r = 0.7603 to 0.9428, p<0.01) than BMI (r = 0.1466 to 0.4855) in all groups of subjects. FFM was found to be positively related with age (r = 0.1646 to 0.9535) and with BF content (r = 0.4154 to 0.8271). Mean TBW content was found to be increased with the increase in BMI and showed positive correlation with BMI (r = 0.4947, 0.3834, 0.7715 and 0.5119 for CED, UW, N and O subjects respectively). From the results of present study, it is said that anthropometric measurements and body composition are influenced by BMI status of young college going females.</p</p

CONCLUSION:

From the results of present study, it is said that anthropometric measurements and body composition are influenced by BMI status of young college going females.

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