BODY COMPOSITION CHARACTERISTICS AMONG THE ADULT TAI AHOM FEMALE OF LAKHIMPUR DISTRICT, ASSAM

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Abstract: The body composition is important because it measures the overall health and fitness level in terms of body fat percentage. The measurements of size and body composition can be used to mark the ability of the system to function. The body composition characteristics are examined to understand the health status among 429 adult Tai Ahom women of Lakhimpur district, Assam. The measurements like Stature, Weight, Waist Circumference and Hip Circumference are collected with the help of anthropometric method. Anthropometric indices like Conicity Index (CI), Waist Hip Ratio (WHR), Waist Stature Ratio (WSR) are calculated for the present study. Anthropometric indices are powerful indicators of environment and the plasticity of the human body. The present study concluded that the adult Tai Ahom women fall in the high-risk category indicating the presence of higher visceral fat and shows a health risk.

Introduction:

Body composition is emerging as a primary determinant of health. In the healthy adults, body composition is maintained over the short term within narrow limits. Illness may have a significant effect on body composition; malnutrition is a major complication. Body composition assessment involves quantification of the amount and relative proportion of fat, muscle and bone, and their chemical components. Significant changes in the body composition occur during growth and development, especially during infancy and puberty. Thus, body composition assessment in children is far more challenging than in adults, and serves a variety of purposes. In India, most of the body composition studies are concerned with the problem of under-nutrition, although there is evidence of socio-economic and nutrition transition that is likely to increase the epidemic of chronic diseases and obesity, particularly in the urban areas (Shetty, 2002).

Body composition is highly varied and widely recognized in relation to age, gender, race, diet and physical activity levels, hormonal and genetic and disease condition. Body compositional changes including the regional distribution of body fat, are especially larger during the pubertal transition and marked in sexually dimorphic (Rogel *et. al.,* 2002). Chakraborty & Bose (2009) studied to test the relative efficiency of waist circumference (WC), hip circumference (HC), waist-hip ratio (WHR) and conicity index (CI) to predict BMI and PBF among Bengalee Hindu male slum dwellers. In the study WC showed the strongest significant (p<0.001) partial correlation with BMI and PBF. Milanovic *et.al.,* (2011) studied the basic anthropometric characteristics and body composition of elderly individuals between 60 to 80 years of age on the basis of collected data and analyzed papers published between the years of 1990 and 2011. The study states that aging is associated with a higher percentage of body fat and body fat redistribution. The redistribution of fat predominantly from lower-body to subcutaneous fat in the abdominal and visceral section is quite frequent despite an apparent decrease in the BMI. Das *et.al.,* (2012) undertook a cross-sectional study of 246 (18-76 years) rural Bauri women of West Bengal to understand the difference in prevalence of under-nutrition and body composition between 3 age groups Group I (18-33), Group II (34-66) &

Group III (>66 yrs). This concludes that with increasing age, the values of anthropometric measurements rise significantly with a subsequent fall among older rural Bauri women.

A large number of studies on age related changes and body composition have been conducted on different ethnic groups in India and a few in the North East. The Tai Ahoms of Lakhimpur district is one such population among whom the age changes from childhood to adulthood and body composition has not been done till now. Therefore, the present study has been undertaken on this section of population living in the district Lakhimpur in Assam to highlight the body composition characteristic characteristics such as Waist circumference, Waist Hip Ratio, Waist Stature Ratio and Conicity Index.

Methods and Materials:

The present study was carried out among 429 Tai Ahoms females of North Lakhimpur, Assam. Their age ranges from 20 years and above to study the changes young adult to old adults. The subjects were grouped into nine different groups with five years interval each. Anthropometry has been extremely useful in identifying changes in body size and composition. In view of the importance of age changes in the anthropometric characteristics, it helps to understand the process of change in physical growth and body composition, ultimately suffice the knowledge. The anthropometric measurements provide an indirect assessment of body composition which is easy and is essential to undertake them for research Anthropometric measurements like height, weight, waist circumference, abdominal circumference, hip circumference.

The Tai Population in India is mostly confined to the states of Assam and Arunachal Pradesh. The Tais, as a great assimilative people, accepted the best of others wherever they went. The Shan was a group of this great family, and a section of it intruded Assam in the early part of the 13th century A.D. Today they are known as Ahoms. Their racial brethren are the Khamtis, Phakes, Aitons, Kamyangs and the Turungs, whose forefathers in filtered into this land following those of the Ahoms. The Tais belong to the great Mongolian race. Tai Ahoms the biggest Tai community in the state of Assam, has been selected for the study.

Results and Discussion:

Waist circumference is affected by both visceral fat and subcutaneous fat deposition and the use of WC alone is considered to provide more accurate indirect measure of visceral fat. It is less influenced by age, sex, height and overall obesity (Han *et.al.,*1997; Janssen *et.al.,*2002). In the present study (Table1)17.95% of females were found to be at a high health risk level category. The highest percentage of females i.e., 63.04% belonging to age categories 55-60 years are in the high health risk level. 50.35% of females are at low health risk level. With the increasing age the percentage of very high risk increases as detected by WC. The hormonal changes associated with aging include decreases in growth hormone secretion (Corpas *et.al.*,1993; Harman & Blackman,2004), menopausal estrogen deficiency in women and diminished levels of total and bio-available testosterone (Harman *et.al*.,2001) in males.

In Table 2 the Waist-hip ratio (WHR) is widely accepted for body fat measurements. It provides an indication of the predominance of fat storage in the abdominal region. It is an indicator of obesity. To calculate Waist Hip Ratio the measurements of the waist circumference is divided by the hip circumference. World Health Organization's (WHO, 2008) cut-off points were used to identify subjects at risk i.e., Waist hip ratio ≥0.85 for women. The study shows that 28.21% females were found in the high health risk level i.e., they have high abdominal obesity. 39.86% of moderate and 31.94% fall in the low health risk level. Derby *et.al.,(*2006) reported that there is an inverse association of total and free testosterone with BMI, WC and WHR. Compared with the Caucasian population, both Chinese and South Asians have more visceral and total adipose tissues at a specific waist circumference (Lear *et.al.,*2007). Molarius *et.al*.,(1999)

reported from a study of 19 population where WC and WHR increased with the increase in age. Hughes *et.al.*,(2004) reported that among the elderly population the waist circumference increased significantly in the women but not in men, whereas hip circumference decreased significantly in the men Asian Indians have relatively higher truncal and abdominal fat mass as compared to Caucasians and black population despite similar or less average values of waist circumference (Misra & Vikram, 2004). Banerji et.al., (1997) showed that visceral adipose tissue mass of Asian Indians was identical to African-American men, despite lower waist circumference.

Table 3 depicts the Waist Stature Ratio (WSR) of the Tai Ahom females. The waist-to-height ratio (WHtR), also called waist - to-stature (WSR) is a measure of the distribution of body fat. Higher values of WHtR indicate higher risk of obesity related cardio-vascular diseases. It correlates with the abdominal obesity. WSR over 0.5 is critical and signifies an increased risk. Waist-to-height ratio of 0.5100 is equivalent to BMI of 25. (Browning *et.al.*,2010). The obesity percentage are higher than the normal category (<0.50). The maximum percentage (95.65%) of females of the age group 55-60 years with abdominal obesity. After that the percentage of females decreases. WSR or WHtR, which comprehensively considers the impact of height and WC, varies little as a function of race, age, and gender, and is relatively stable (Aswell & Hsieh, 2005) This is because the height of an individual influences the distribution of fat, and this factor should be taken into consideration before adopting any anthropometric variable as a measure of adiposity. On average, men are taller than women and have larger waist circumferences.

Conicity index (CI) assess the obesity and distribution of fat tissues, considering the central obesity, more than total body obesity, is associated with increased diagnosis of cardiovascular risk (CVD). For CVD risk calculation, the values proposed by Pitanga *et.al., (*2011) were used i.e., ≥1.18 for women & ≥1.25 for men. Table 4 depicts the Conicity index of adult Tai Ahom females which shows the fat distribution and provides the trunk adiposity measure. CI which assesses obesity and distribution of fat tissues, considering the central obesity. The values proposed by Pitanga *et.al., (*2011) were used i.e., ≥1.18 for women. While the Tai Ahom females as per Conicity Index. It reveals that 60.37 % of females are at high health risk and 40.09% are to found to be at normal. The table also depict that the females of 55-60 years show highest percentage of health risk (91.30%) and lowest (37.78%) in the age category of 25-30 years. Bauri females of West Bengal also show the similar trend of occurrence, where the females belonging to 34-66 years had the higher mean values of CI (Das et.al., 2012).

Table 1.Abdominal obesity among adult Tai Ahom as per Waist Circumference:

Age groups	Sa	Low <80cm	High≥	Very high≥88cm
20 - 25	53	42 (77.36%)	12 (22.64	0
25 - 30	45	42 (93.34%)	2 (4.44%	1 (2.22%)

Age group	Sa			
30 - 35	58	44 (75.87%)	12 (20.68	2 (3.45%)
35 - 40	47	8 (17.02%)	27 (57.45	12 (25.53%)
40 - 45	41	19 (46.34%)	19 (46.54	3 (7.32%)
45 - 50	45	22 (55.12%)	11 (24.44	11 (24.44%)
50 - 55	39	13 (33.34%)	13 (33.33	13 (33.33%)
55 - 60	46	2 (4.35%)	15 (32.61	29 (63.04%)
60 & above	55	24 (43.65%)	25 (45.45	6 (10.90)
Total	429	216 (50.35%)	136 (31.70	77 (17.95%)

Cut –off points recommended by WHO 2008

Table 2 Abdominal obesity among adult Tai Ahom as per Waist Hip Ratio:

Age group	Sa	Low Risk ≤0.80	Moderate Risk 0.81-0.85	High Risk ≥0.86
20 - 25	53	12(22.64)	33(62.26)	8(15.09)
25 - 30	45	28(62.22)	14(31.11)	3(6.66)
30 - 35	58	27(46.55)	25(43.10)	6(10.34)
35 - 40	47	7(14.89)	25(53.19)	15(31.90)

40 - 45	41	17(41.46)	18(43.90)	6(14.63)
45 - 50	45	17(37.78)	20(44.44)	8(17.78)
50 - 55	39	9(33.07)	13(33.33)	17(43.59)
55 - 60	46	1(2.17)	8(17.39)	37(80.43)
60 & above	55	19(34.55)	15(27.27)	21(38.18)
Total	429	137(31.94)	171(39.86)	121(28.21)

Cut-off points recommended by WHO (2008)

Table 3 Distribution of Waist-Stature-Ratio among adult Tai Ahom:

Age group	Sampl	Normal <0.50	High / Obese ≥0.50
20 - 25	53	30(56.70%	23(43.40%)
25 - 30	45	35(77.78%	10(22.22%)
30 - 35	58	36(62.07%	22(37.93%)
35 - 40	47	7(14.89%)	40(85.11%)
40 - 45	41	18(43.90%	23(56.10%)
45 - 50	45	20(44.44%	25(55.56%)
50 - 55	39	11(28.21%	28(71.79%)
55 - 60	46	2(4.35%)	44(95.65%)
60 & above	55	20(36.36%	35(63.64%)
Total	429	179(41.72	250(58.28%)

Cut –off points as recommended by Browning *et.al*.,2010

Table 3.54 Distribution of Conicity Index among adult Tai Ahoms:

Age group	Sample	Normal <1.18 for female	High / Obese ≥1.18 for female
20 - 25	53	24(45.28%)	29(54.72%)
25 - 30	45	28(62.22%)	17(37.78%)
30 - 35	58	26(44.83%)	32(55.17%)
35 - 40	47	25(53.19%)	22(46.81%)
40 - 45	41	20(48.78%)	21(51.22%)
45 - 50	45	18(40.00%)	27(60.00%)
50 - 55	39	10(25.64%)	29(74.36%)
55 - 60	46	4(8.70%)	42(91.30%)

| 60 & above | 55 | 15(27.27%) | 40(72.73%) |
| Total | 429 | 170 (40.09%) | 259(60.37%) |

Cut- off points as recommended by Pitanga *et.al.*,2011

Conclusion:

In the present endeavour the age-related changes have been studied anthropometric and body composition characteristics among the adult Tai Ahom females of Lakhimpur, Assam. Since, the body composition is directly related to health, a normal balance of body fat therefore is associated with good health and longetivity. Excess fat in relation to lean body mass can greatly increase the risk to cardiovascular disease, diabetes and more. The central obesity parameters indicate the adiposity which is the indicators of obesity. The Tai Ahom women fall in the high-risk category indicating the presence of higher visceral fat as indicated by the waist circumference. Waist-to-Stature ratio indicating risk of obesity related to cardio-vascular diseases has been found to be maximum among the 55-60 years age category of women. Trunk adiposity measure of Conicity index also has detected the higher age groups to be more at health risk than the younger age categories.

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