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Biacromial And Biiliac Diameters In A Young Adult Southeastern Nigerian Population

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ABSTRACT

Reference standards of anthropometric measurements for any given population form the basis on which populations can be compared with one another. Relationship between body physique and certain diseases has long been recognized. The aim of the study was to provide normal values of biacromial and biiliac diameters for a young adult southeastern Nigerian population. A cross sectional study of 402 male and 268 female students of University of Nigeria Enugu Campus was done. Their ages ranged from 20 to 28. The mean values of biacromial diameter in males and females were 40.1 1.8cm and 36.3 1.8cm respectively. The corresponding values for biiliac diameter were 25.5±1.3cm and 25.9±1.3cm respectively. Males had significantly larger values of biacromial diameter than females while females had significantly larger values of biiliac diameter than males, $p < 0.001$. The subjects had larger mean values of biacromial diameter than most of the Caucasian and Asian populations. On the contrary the mean values of biiliac diameter were lower than the Caucasian and Asian values.

Keywords: Biacromial and biiliac diameters, nomograms, adult Southeastern Nigerians

Racial differences in body physique have been extensively documented. Nwoye (1989) showed that the existing formulae for the calculation of body surface area based on data from Caucasians do not predict the body surface area of Nigerians accurately. Relationship between body physique and illnesses has also been of interest to a number of authors.

Milne (1972) studied the physique of psychiatric patients. Demark-Wahnefried et al. (1997) indicated that anthropometry may help to uncover potential risk factors for prostate cancer. In their study, prostate cancer cases exhibited a propensity toward a slight upper body skeleton. The biacromial breadth-to-height ratio and biacromial breadths were greater among controls than in prostate cancer patients. Hojbjerg and Weis (1997) showed that adult women with the Ullrich-Turner syndrome have a characteristic anthropometric shape. Their biacromial diameter compared favourably with the control group while their biiliac diameter was above average. Cameron and Scheepers (1986) used biacromial and biiliac diameters as well as the subischial length to calculate the gynandromorphy. They showed that tuberculosis patients were more gynandromorphic than normal individuals. Normal subjects had significantly greater biacromial diameter than patients with tuberculosis

Body physique is also of interest in sports medicine. Hollings and Robson (1991) noted differences in the body build of athletes involved in field and tract events. In a study of volleyball players, Gualdi-Russo and Zaccagni (2001) showed that the physique of athletes is characterized by higher ectomorphy and lower endomorphy and mesomorphy.

The literature review showed that there is no documented study on biacromial and biiliac diameters in Nigerians. The present study was aimed at providing reference standards of biacromial and biiliac diameters in a young adult population from the Southeastern part of Nigeria where the predominant tribe is Igbo.

MATERIALS AND METHODS

A cross sectional study of 402 males and 268 females was conducted in 1990. The subjects were students of the University of Nigeria Enugu Campus and their ages ranged from 20 to

28. The biacromial and biiliac diameters were measured with a sliding caliper. The measurements were made from behind with the subjects standing. The biacromial diameter is the distance between the most lateral margins of the acromion processes of the scapulae. Care was taken to ensure that the shoulders were not braced back as this would reduced the diameter. The biiliac diameter is the distance between the iliac tubercles. Whenever necessary, the measurement was taken with pressure so as to compress the overlying fat.

RESULTS

Table 1 shows the mean biacromial diameter of males and females by age. Males had significantly larger mean biacromial diameter than females, $p < 0.001$. As shown in table 2, females had larger mean biiliac diameter than males. The mean sex difference in biiliac diameter was statistically significant $p < 0.001$. Tables 3 a & b show the comparative data on biacromial and biiliac diameters. While the mean biacromial diameter of males was the highest among the populations studied, the biiliac diameter was among the lowest. The mean biacromial diameter of females was also among the highest even though the biiliac diameter was among the lowest. The difference in the mean biacromial and biiliac diameters of males in this study was 14.6cm. The value for females was 10.4cm. These differences were the highest among the populations compared. In both sexes the biiliac-biacromial index was among the lowest.

Table 1 Biacromial Diameter (cm) Of Males And Females By Age

	Male			Female		
Age(yr)	No.	Mean	SD	No.	Mean	SD
20	91	40.0	1.8	83	36.1	2.0
21	73	39.9	1.6	65	36.3	1.5
22	72	40.0	1.8	53	35.8	1.9
23	51	40.0	1.4	34	36.7	1.6
24-28	115	40.4	1.9	33	36.7	1.8
ALL	402	40.1	1.8	268	36.3	1.8

Table 2. Biiliac Diameter (cm) Of Males And Females By Age

	Male			Female		
Age(yr)	No.	Mean	SD	No.	Mean	SD
20	91	25.5	1.4	83	25.9	1.4
21	73	25.3	1.1	65	26.0	1.3
22	72	25.4	1.2	53	25.8	1.2
23	51	25.6	1.1	34	26.1	1.2
24-28	115	25.6	1.4	33	25.9	1.1
ALL	402	25.5	1.3	268	25.9	1.3

Table 3a. Comparative Data On Biacromial And Biiliac Diameters (cm) And Biacromial/Biiliac Index (%) Of Males

Country	Place/Subjects	Authors	Age (yr)	Biacro. (cm)	Biiliac (cm)	Diff. (cm)	Bii/biac %
Britain	Edinburgh	Milne, 1972	20-24	39.8	28.6	11.2	71.9
Brazil	Xingu Indians	Eveleth et al., 1974	20-24	37.3	26.8	10.5	71.8
Japan	Tokyo, Students	Ngamine & Suzuki, 1964	18-29	38.5	27.5	11.0	71.4
USA	Japanese-Americans	Froelich, 1970	23	39.1	27.7	11.4	70.8
Chad	Sara	Hiernaux, 1972	20-30	37.8	25.8	12.0	68.3
South Africa	Tswana	Cameron & Scheepers, 1986	23	37.3	24.7	12.6	66.2
Nigeria	Enugu, students	Present study	20-28	40.1	25.5	14.6	63.6

Table 3b. Comparative Data On Biacromial And Biiliac Diameters (cm) Of Females

Country	Place/Subjects	Authors	Age (yr)	Biacr. (cm)	Biiliac (cm)	Diff. (cm)	Bii/ biac %
Britain	Edinburgh	Milne, 1972	20-24	36.5	27.8	8.7	76.2
Brazil	Xingu Indians	Eveleth et al., 1974	20-50	32.9	26.8	6.1	81.5
Japan	Tokyo, Students	Ngamine & Suzuki, 1964	18-23	34.6	27.4	7.2	79.2
USA	Japanese-Americans	Froelich, 1970	19.9	34.9	27.1	7.8	77.7
Chad	Sara	Crognier, 1969	-	34.5	25.7	8.8	74.5
South Africa	Tswana	Cameron & Scheepers, 1986	19	33.9	24.1	9.8	71.1
Nigeria	Enugu, students	Present study	20-28	36.3	25.9	10.4	71.3

DISCUSSION

The relationship between biacromial diameter and biiliac diameter is a frequently cited example of sex dimorphism in adults. Men have larger shoulders to hips than women. The sex dimorphism is apparent after the age of 5 but becomes strong at adolescence when boys gain more shoulder width per unit hip width while girls gain more hip width per unit shoulder width (Eveleth 1978). The mean biacromial diameter of 40.1cm in males in this study was significantly larger than the 36.3cm in females. This observation is keeping with the findings of other authors. Among the various populations under comparison, the males in this study had the largest mean biacromial diameter. Except for the British value, the females also had the highest mean biacromial diameter. All the other studies under comparison showed that males had larger or similar values of biiliac diameter than females. Our study did not corroborate this. The females had significantly larger mean biiliac diameter than the males. The mean values of biiliac diameter in our study were lower than the Caucasian and Asian values. South African and Chadian values were also lower than the Caucasian and Asian values.

The mean difference between the biacromial and biiliac diameters was 14.6cm in males and 10.4cm in females. They were the highest among

the populations compared. Eveleth et al. (1974) in a study of Brazilian Indians reported a difference of 10.5cm in males and 6.1cm in females. The values for South Africa and Chad were also higher than the Caucasian and Asian values. The mean values of biiliac-biacromial ratio in the present study and those reported for South Africa and Chad were lower than the values for Caucasians and Asians. Eveleth and Tanner (1976) noted that Afro-American boys and girls in Washington had considerably narrower hips to shoulders than the British or Hong Kong Chinese. The same observation was also made in children of African origin in Philadelphia, Havana and South Africa. Our findings are in keeping with these observations.

Masculinity is positively related to biacromial diameter and negatively to biiliac diameter (Tanner 1951). Raboch (1957) showed that men who were hypogonadal or who had female sex chromatin had smaller biacromial diameters than controls. Women with hirsutism and increased urinary 17-ketosteroid excretion had increased biacromial diameter (Ferriman et al 1957). The relatively large mean values of biacromial diameter and small biiliac diameter in our subjects would suggest that they are more masculine than the Caucasians and Asians.

Our study has provided reference standards of biacromial and biiliac diameters in a young adult Southeastern Nigerian population. These standards are expected to form the basis for future studies on the relationship between physique and illnesses or sports in our population.

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