

ABDOMINAL BODY FATNESS AMONG NIGERIAN WOMEN: A STUDY ON THE ANTHROPOMETRIC INDEX OF WAIST-TO-STATURE RATIO

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ABSTRACT

Objectives: A waist-to-height stature (WSR) is a valid method for assessing accumulation excessive amount of upper body fat that poses a risk to health. As this anthropometric index has hardly been studied in Nigerian women, therefore it was aimed to screen Nigerian women for central fatness.

Methodology: A total of 403 women aged 20 - 51 (42.4 ± 1.6) years were studied. Anthropometric measurements of height, waist circumference (WC) and WSR were measured or calculated. Stature and WC measurements were taken according to the protocol of the International Society for the Advancement of Kinanthropometry (ISAK). WSR was calculated by dividing waist circumference (in cm) by stature (in cm). A WSR >0.5 was used to evaluate excess abdominal fatness.

Results: WSR ranged between 0.45 and 0.76 among the women. Two hundred and sixty-six (66.5%) of the total had central obesity as measured by WSR. At all ages, the proportion of women with a WSR >0.5 increased, declining at later ages. At ages 20-30, 34(35.8%); 31-40, 92(64.4%); 41-50, 114(88.4%), and above 51, 28 (77.8%).

Conclusion: The prevalence of WSR >0.5 was evident in this sample at all ages, suggesting the existence of abnormal central fatness in the women.

KEY WORDS: Waist circumference, Waist-to-stature ratio, Central fatness, Nigeria.

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INTRODUCTION

The WHO definition of obesity as a disease, in which fat has accumulated to an extent that health is adversely affected, links the condition both to excess fatness and risk.¹ Recently, the importance of total body fat and body fat distribution has been highlighted as a major risk factor for both adults and children.² Central adiposity has a negative impact on health that may be distinct from the known effects of generalized obesity.³ Additionally, the risks associated with android obesity (excess in body fat, primarily abdominal) are distinctly higher than those associated with gynoid obesity (excess in body fat, primarily in peripheral depots such

as the thighs and the legs). An upper body or centralized deposition of excess body fat carries an increased risk for obesity-related metabolic complications in adults,⁴ that includes hypertension, diabetes and cardiovascular disease.⁵ Therefore, timely prevention and treatment of trunk obesity have important health implication.

Several studies have supported the claims that central obesity, in particular, the WSR,⁷⁻⁹ provide a superior tool for discriminating obesity-related cardiovascular risk compared to body mass index (BMI), WC, waist to-hip-ratio (WHR) and Conicity index. As such, WSR is increasingly being used to evaluate the risk for diseases associated with central fatness in adults.^{10,11} The rationale underlying this index is that for a given height, there is an acceptable degree of fat stored on the upper body.¹² WSR has also been reported to have closer values between men and women than BMI or WC; therefore, the same boundary value may apply to both men and women.¹⁰ Furthermore, among the various anthropometric indices of BMI, WC and WSR, WSR ≥ 0.5 had the highest sensitivity and more balanced sensitivity and specificity for the identification of any one or clustering of two or more coronary risk factors from the modified ATP III criteria in both genders,^{13,14} and greater simplicity.^{13,15} Therefore, this common anthropometric index can be a useful guideline for providing education in preventive health care.

The aim of this study was to screen for central fatness among Nigerian women using WSR to identify any at-risk individuals and assess age variations in WSR. Given that, this anthropometric indicator of adiposity is known to be associated with detrimental health outcomes, understanding the level of adiposity is important for clinical and preventive purposes.

METHODOLOGY

A cross-sectional survey was conducted on female primary school teachers between the ages of 20-51 years. The sample consisted of 403 female teachers, selected using simple random sampling technique from five geographical

regions in Makurdi, Nigeria. The schools within each geographical location were divided into two groups according to the classification of the Benue State Universal Basic Education Board. To select the sample, the schools in each group were first numbered serially and then depending on the teacher population density; two or three schools were chosen randomly from each category in each of the five geographical locations, i.e. High-Level, Kanshio, North Bank, Wadata and Wurukum. Subsequently, 23 out of the 38 schools in the municipality area were selected.

Inclusion criteria for the study was ≥ 20 years of age. Exclusion criteria for participation were pregnancy, serious illnesses such as malaria, inability to walk unassisted and severe mental disease.

Participants were asked how old they were in years. Whenever available, participants were asked to show their identity cards (provided by the National Republic of Nigeria, National Identity Card) which often provided a date of birth. Age was entered as a whole number year.

The data collection procedure was explained to the participants at each school who subsequently gave written informed or oral consent. Institutional approval was sought and obtained in each individual school before data collection. The Benue State Universal Basic Education granted permission for the study. Data collection took place in February, 2009.

Stature and WC measurements were taken according to the protocol of the International Society for the Advancement of Kinanthropometry (ISAK).¹⁶ Stature was measured to the nearest 0.1 cm, using a mounted stadiometer. Waist circumference was measured to the nearest 0.1 cm, using a flexible tape (Lufkin W606 PM). The waist circumference was taken with the participant standing, by wrapping the tape at the level of the narrowest point between the lower costal (10th rib) border and the iliac crest. WSR was calculated by dividing waist circumference (in cm) by stature (in cm). A WSR ≥ 0.5 was used to evaluate excess abdominal fatness. Data was analyzed using SPSS version 17.0.

RESULTS

The mean (SD) stature, waist circumference and WSR were 159.4 (5.5) cm, 84.7 (11.4) cm and 0.53 (0.07), respectively. Pearson's correlation coefficient between stature and waist circumference was 0.756 ($p < 0.01$). WSR ranged between 0.45 and 0.76 among the women. A total of 266 (66.5%) had central obesity as measured by WSR. At all ages, the proportion of women with a WSR ≥ 0.5 increased, declining at later ages. At ages 20-30, 34(35.8%); 31-40, 92(64.3%); 41-50, 114(88.4%), and above 51, 28 (77.8%). Age group 41-50 had the highest prevalence of central obesity (Table-II).

DISCUSSION

Epidemiological studies have increasingly stressed the importance of body fat distribution in determining cardiovascular risk status. Of all other prognostic indicators of central fat adiposity, WSR seems a simpler, cheap and non-invasive indirect anthropometric index to screen for metabolic risk. For example, in resource-poor settings or large epidemiological surveys, WSR has the added value of only requiring a tape measure rather than both a weighing scale and a tape measure, as required for BMI. A WSR boundary value of ≥ 0.5 has been proposed as a simple but effective index for the detection of higher metabolic risk among individuals with full BMI range, overweight persons, and higher-risk normal weight individuals.¹⁰ In this community majority of the women had a higher central abdominal fatness as measured by WSR (≥ 0.5). Also, centralized abdominal fat is significantly higher in successively older women, beginning with the middle-aged women. Compared with Western populations, our sample shares the anthropometric pattern of greater

Table-I: Anthropometric characteristics of the participants.

Variables	Mean \pm SD
Age (years)	42.4 \pm 1.6
Stature (cm)	159.4 \pm 5.5
Waist circumference (cm)	84.7 \pm 11.4
Waist-to-stature ratio	0.53 \pm 0.07

central adiposity in older younger individuals. This finding in another human group supports the notion that greater centralization of adipose tissue in older participants is widespread among humans.¹⁷⁻¹⁸

The implication of this finding is that the women may be susceptible to metabolic disorders. The causes of the high level of centralized obesity in these women are not clear. The high-energy, high-fat dietary patterns, in combination with low physical activity levels, may be partly responsible for the observed high abdominal central body fat among women in Makurdi. In many developing countries, intakes of fat, animal products and sugar are increasing simultaneous to decreasing consumption of cereals, fruit and vegetables.¹⁹ Although, no data exist in the present study concerning patterns of food consumption, it is discernable that rapid changes have occurred over the past decades in Nigeria in economic development and market globalization, which probably have parallel significant dietary changes. Street foods, often inexpensive, convenient and fried, were found to comprise 63% of the total weight of food consumed among Nigerian market women.²⁰ This may hold true of the women in this study. It was observed during the data collection that the sale of fried foods and soft drinks was prevalent in all the schools sampled. It is likely that these women teachers patronize these food vendors for their breakfast or snacks. Again in this community the local diet is based around starches, primarily cassava but also yam (contains high energy-dense foods), which are

Table-II: Percentage of women with a waist-to-stature ratio at 0.5 or above cut-off point*

Age (years)	n	WSR ≥ 0.5
		%
20-30	34	35.79
31-40	92	64.34
41-50	114	88.37
Above 51	28	77.78
Total waist-to-stature ratio ≥ 0.5	268	66.50

n = number of females; % = percentage;

*WSR= waist-to-stature ratio.¹²

both processed in various forms. Anecdotal as these may appear, it should not be ignored as the possible explanation for the high centralized abdominal fat observed among the sampled women in this community.

Centralized body fatness may be associated with metabolic disorders in this population, as has been found in others. If this speculation is true, increases in the incidence of chronic diseases can be anticipated. Future research to monitor population levels of body fat distribution, explore causes of such phenomena, and seek solutions to reverse undesirable trend seem warranted. The simple message as recommended by,²¹ keep your waist circumference to less than half your height should be applied.

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