OVERWEIGHT AND OBESITY AMONG ELDERLY NIGERIANS

Boniface [1]Ochayi, [2]Thacher, T. D

[1]Department of Family Medicine, Jos University Teaching Hospital, PMB 2076, Jos, Nigeria
[2]Department of Family Medicine, Mayo Clinic, 200 First Street SW, Rochester, Minnesota 55905, USA

Corresponding author: Dr. Tom D. Thacher
Department of Family Medicine, Mayo Clinic, 200 First Street SW, Rochester, Minnesota 55905,
Phone: (507) 284-4584. Fax: (507) 284-5067
        E-mail: thacher.thomas@mayo.edu
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Abstract
Introduction: A growing health problem, obesity exacerbates decline in physical function. We determined the prevalence of overweight and obesity and associated risk factors among an elderly Nigerian population.

Methods: We screened a stratified, random community sample of 274 persons aged 65 years and older for overweight (BMI 25.0-29.9 kg/m^2), obesity (BMI >30 kg/m^2), and known risk factors.

Results: The overall prevalence of overweight and obesity was 13.5% (95%CI 9.7-18.1%) and 4.7% (2.6-8.0%), respectively. Obesity among females was 7.0% compared with 2.3% among males (OR 3.4; 95%CI 0.9-12.4). Hypertension was more frequent in those overweight or obese (70.0%) than in those of normal weight (43.9%; P=0.002). Hypertension (OR 2.9; 1.3-6.7) and female sex (OR 3.3; 1.4-7.9) were significant risk factors for overweight and obesity in logistic regression.

Conclusion: Overweight and obesity affect a substantial proportion of elderly Nigerians and are associated with hypertension, potentially increasing the risk of cardiovascular disease.

Key Words: nutrition, geriatric, Africa, body mass index, epidemiology

INTRODUCTION
By 2005 about three quarters of the estimated 120 million people aged 60 years and older lived in developing countries. The elderly population in the developing world is predicted to rise despite death due to malnutrition, poverty, human conflicts, and infectious diseases, including AIDS.[1] The prevalence of obesity is increasing in all age groups, including those over age 65 years. Overweight has been implicated in a variety of chronic health problems, including hypertension, coronary artery disease, stroke and osteoarthritis. Obesity has been associated with greater disability in older patients than in the general population.[2,3] The risk of death from all causes, cardiovascular disease, and cancer increases with increasing overweight and obesity in both sexes and in all age groups.[4] Recent reports demonstrate decreased morbidity, mortality, and attendant psychological and social costs when physicians recognize and treat obesity.[5-7]
Few studies have evaluated the burden of obesity in elderly persons in sub-Saharan Africa. The aim of this study was to assess the prevalence of overweight and obesity in elderly persons in central Nigeria and identify associated risk factors.

METHODS
The study was conducted as part of a dementia survey in central Nigeria[8] between January and December 2002 in the Jos South Local Government Area, consisting of twelve administrative wards with a population of 229,018. The residents were primarily civil servants, miners, and farmers. Approval for the study was obtained from the Ethical Committee of the Jos University Teaching Hospital. Informed consent was obtained from district and wards heads and from each subject recruited for study. If a subject was judged incompetent to

give informed consent, consent was obtained from a family member.

Eight wards were randomly selected for survey. Using a stratified random sampling technique, one street from a list of streets in each ward was randomly selected. The starting household was randomly selected from each street, and interview was conducted from house to house until the required number of subjects from each ward was obtained. Persons above 65 years were eligible for inclusion, unless they were too ill to participate. For those whose date of birth was unknown, we used recall of prominent historical local events known to the population to estimate age.[9] There are no residential care facilities for the elderly in the local government area. While subjects stood without shoes on a flat surface against a wall, a horizontal ruler was used to mark the height and standing height was measured. Weight was measured in light clothing, without shoes, with a portable weighing scale.

Each subject was interviewed by one of the investigators (BO) to obtain information about activities of daily living, alcohol use, smoking, and history of hypertension or stroke. When necessary a family member provided further clarification during the interview. Blood pressure was recorded in a sitting position. Hypertension was defined as either systolic blood pressure >140 mm Hg or diastolic blood pressure >90 mm Hg. Underweight was defined as body mass index (BMI) <20 kg/m^2, normal weight as BMI 20 – 24.9 kg/m^2, overweight as BMI 25 – 29.9 kg/m^2, and obesity as BMI ≥30 kg/m^2.[5, 10]

Data entry and analysis were performed with Epi Info 2002 (CDC, Atlanta, Georgia). Mean values and standard deviations were calculated for normally distributed continuous variables. The chi-square test was used to assess associations between various risk factors and overweight and obesity. All variables associated with dementia with a P value <0.25 in the univariate analysis were entered as independent variables in a logistic regression model. Backward stepwise elimination was used to identify independent risk factors for overweight and obesity.

RESULTS

Of 280 elderly persons enrolled in the study, 274 had height and weight data that allowed

calculation of BMI and are the subject of this report. Of these 132 were male and 142 were female. The mean age was 73±9 years and did not differ significantly between males and females (72.9±8.0 and 73.0±8.9 years, respectively; p=0.91). The mean weights were 59.1±11.3 kg and 52.4±12.2 kg for males and females, respectively (p<0.001). Mean heights were 1.65±0.08 m for males and 1.55±0.07 m for females (p<0.001). The mean BMI values were 21.6±3.6 kg/m^2 and 21.8±4.4 kg/m^2 for males and females, respectively (p=0.77). Characteristics of the study subjects in relation to overweight and obesity are shown in Table 1. A total of 13 subjects were obese, 37 were overweight, 114 were normal weight, and 110 were underweight. The overall prevalence of overweight was 13.5% (95%CI 9.7-18.1) and the prevalence of obesity was 4.7% (2.6-8.0%). The prevalence of underweight was 40.1% (34.3-46.2%). The prevalence of obesity among females was 7.0% compared with 2.3% among males (OR 3.4; 95%CI 0.9-12.4).

We compared risk factors for overweight and obesity subjects with those classified as normal weight. The proportion of elderly persons with hypertension was significantly greater in those classified as overweight or obese (70.0%) than in those of normal weight (43.9%; P=0.002). The mean BMI of hypertensive subjects was 22.3±4.5 kg/m^2 compared with 21.0±3.5 kg/m^2 in subjects with normal blood pressure (P=0.01). Subjects with any formal primary education had a greater mean BMI (23.3±4.2 kg/m^2) than those with no formal education (21.2±3.9 kg/m^2; P<0.001). Urban dwellers had a significantly greater BMI than rural dwellers (22.3±4.2 versus 21.3±3.9 kg/m^2, respectively; P=0.03). We carried out a logistic regression analysis that grouped obesity and overweight as a single dependent variable and included age, sex, urban location, alcohol use, hypertension, and formal education as risk factors. Only hypertension (OR 2.9; 1.3-6.7) and female sex (OR 3.3; 1.4-7.9) were significant risk factors for overweight and obesity. Multiple linear regression of the same six risk factors with BMI as the dependent variable revealed that hypertension (P=0.03) and formal education (P=0.01) were significantly related to BMI. However, the model including these risk factors explained only 8% of the total variation in BMI.

TABLE 1. Risk Factors for Obesity and Overweight in Elderly Nigerian Subjects.[*]

Characteristic	Total	Obese or Overweight[†] (N=50)	Normal Weight (N=114)	OR (95%CI)	P-v
Sex					
Female	81	32	49	2.4 (1.2-4.7)	
Male	83	18	65		
Hypertension[‡]					
Yes	85	35	50	3.0 (1.5-6.1)	
No	79	15	64		
Current smokers					
Yes	17	3	14	0.45 (0.10-1.8)	
No	142	46	96		
Alcohol					
Yes	64	14	50	0.47 (0.22-1.0)	
No	75	28	47		
Location					
Rural	91	23	68	0.58 (0.29-1.1)	
Urban	73	27	46		
Formal education[§]					
Yes	47	18	29	1.6 (0.81-3.4)	
No	117	32	85		

[*] Not all totals are the same because of missing data for some subjects.
[†] BMI≥25.0 kg/m^2
[‡] Hypertension was defined as either systolic blood pressure >140 mm Hg or diastolic blood pressure >90 mm Hg.
[§] Formal education is defined as any primary education.

DISCUSSION

The overall prevalence of overweight and obesity among elderly persons in this study was 13.5% and 4.7%, respectively. These prevalence rates are lower than those generally reported from other countries. A Canadian national population survey among older adults reported a prevalence of overweight and obesity of 39% and 13%, respectively.[11] A similar survey in Taiwan reported a prevalence of overweight in elderly persons of 27% and 35% in males and females, respectively, and the prevalence of obesity was 3.2% and 6.4% in males and females, respectively.[12] In 2000, the prevalence of obesity in the United States was 20%.[13] Geographic variation in the prevalence of obesity in the elderly may reflect ethnic, nutritional, activity-related, or environmental factors.

Obesity is associated with decreased survival. Data from the Framingham Heart Study found that adults who were obese (BMI >30) at age 40 yrs lived 6–7 years less than their normal-weight counterparts.[14] The effect of obesity is potentially more profound in developing countries, where accessibility to good health facilities is poor. Additionally, in many developing countries, obesity is perceived as evidence of prosperity and success. Those with obesity may pay less attention to their weight, predisposing them to the complications of obesity and increased morbidity and mortality. Reduced survival may have contributed to the low prevalence obesity in our elderly Nigerian population.

In industrialized societies, over nutrition and consumption of an energy dense western diet coupled with a sedentary lifestyle are the major contributors to the development of obesity in all age groups.[13, 15] The Nigerian diet, characterized by unrefined cereals with high fiber content, and high energy expenditure in activities of daily living, may have contributed to a reduced risk of obesity. Most of our study population resided in rural areas, where involvement in farming activities well into advanced age is common. We did not assess the level of physical activity. Our finding that a greater proportion of obese people were located in urban area than in rural areas is consistent with less physical activity or greater food intake among urban than rural dwellers.

The relationship between BMI and proportion of body fat can be altered in older adults. Changes in body composition and loss of height caused by compression of vertebral bodies and kyphosis occur with aging.[16] Therefore, at any given BMI value, the percentage of fat mass is increased in elderly persons, whereas the BMI would increase due to a loss of height. We did not measure skin fold thickness or abdominal and waist circumference, which would have provided additional information regarding body fat and cardiovascular risk.

Hypertension was one of the strongest risk factors associated with obesity in this study population. While hypertension is common in the older population, affecting 30-50% of all persons age 65 years and above,[17] data from US and Japanese populations indicate that obesity and high blood pressure continue to correlate, even in old age.[18-20]

One limitation of our study was the relatively small sample size, resulting in rather wide confidence intervals for our estimates. Our study was also limited by the need to estimate ages for those whose date of birth was unknown. Age was assessed by use of historical landmarks, which has previously been shown to be accurate within three years.[9] The cross-sectional design is limited with regards to identifying risk factors for obesity, primarily because it is difficult to ascertain if a given risk factor preceded the development of obesity.

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