



**Introduction**

Obesity in the United States has reached epidemic proportions and its prevalence continues to rise as Americans become less physically active and more sedentary. Among adolescents, African Americans exhibit the highest rates of obesity. Based on data from the 1999-2000 National Health and Nutritional Examination Survey (NHANES III) it is estimated that the prevalence of obesity in African American adolescents (23.6%) is significantly higher than their non-Hispanic white counterparts (12.7%) and has increased by 13.4% between 1988-1994 and 1999-2000. As obesity among African Americans adolescents continues to increase the rate of metabolic abnormalities, cardiovascular disease and type II diabetes among this group will mimic this increasing trend.

Not only is obesity a known independent risk factor for the development of cardiovascular disease (CVD), but it tends to cluster with other cardiovascular risk factors including hypertension, dyslipidemia, insulin resistance and diabetes. It has also been demonstrated that greater central body fat influences the presence of various CVD risk factors (plasma triglycerides, HDL cholesterol, systolic hypertension and left ventricular mass) independent of obesity. What is unclear is whether the aggregation of CVD risk factors occurs more often in total obesity or obesity in the android/abdominal region. The purpose of this study is to evaluate the relationship between hypertension with BMI and waist circumference.

**Methods**

Respondents were freshmen at a historically black university in South Carolina enrolled in a mandatory class. Three categories of BMI were compared (normal:<25, overweight: ≥25 and obese: ≥30. The categories of BMI were chosen to correspond to national recommendations that define healthy weight, overweight and obesity. Similarly, the category for abdominal obesity was selected (>40 in. for male and >35 in. for female). As a comparison, obesity estimates were also determined using Stunkard's Body Figure Scale (nine silhouettes of similar figures ranging in appearance from underweight to extremely obese for males and females for which BMI norms have been estimated). Participants were asked to select figure which best represents current body size.

Data regarding sociodemographic variables were obtained through use of a questionnaire. Hypertensive status was also determined by questionnaire: students who report having been told by a physician that they have hypertension or are taking medication for hypertension. Statistical analysis was done using SAS. The distribution of sociodemographic characteristics of hypertensive respondents were compared using chi-square statistic. Odds ratios and 95% confidence intervals were calculated for presence of hypertension among overweight and obese by each obesity measure.

**Results**

Table 1 shows the distribution of sociodemographic variables among hypertensives. The prevalence of hypertension in this population is 2.4% with females having a higher rate than males (3.15 vs. 1.42). The reporting of hypertension is evenly distributed throughout the various income levels. Hypertensives are also similar in their birth state and smoking status. Individuals with a low physical activity level have a higher rate of hypertension compared to individuals with a high physical activity level. Hypertensives and normotensives are similar in sex, income level, physical activity level, smoking status and being a

Respondent Characteristics	Hypertensive	p-value
<b>Total(%)</b>	12(2.41)	
<b>Sex</b>		.212
Male	3(1.42)	
Female	9(3.15)	
<b>Household Income</b>		.601
<\$15,000	2(3.39)	
\$15,000-\$25,000	1(1.47)	
\$25,000-\$35,000	2(2.74)	
\$35,000-\$45,000	0(0)	
\$45,000-\$55,000	1(1.85)	
\$55,000-\$75,000	2(3.85)	
>\$75,000	2(3.70)	
<b>South Carolina Native</b>		.758
Yes	9(2.59)	
No	3(2.11)	
<b>Physical Activity Level</b>		.269
None	0(0)	
Low	7(2.70)	
Moderate	3(2.42)	
High	1(1.92)	
<b>Smoking</b>		.364
Yes	0(0)	
No	12(2.59)	
<b>Family History</b>		.001
Yes	11(4.82)	
No	1(0.37)	

Table 1. Sample Sizes and Sociodemographic Characteristics of Hypertensive Respondents

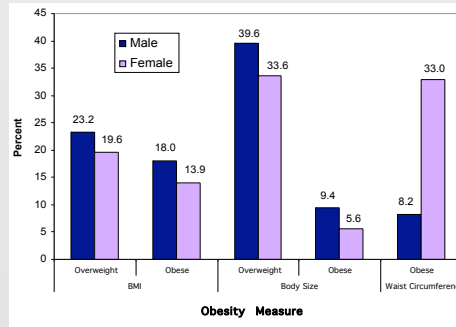


Figure 1. Prevalence of Obesity by Obesity Measure and Gender

Obesity Measure	Odds Ratio	Confidence Interval
<b>BMI</b>		
Overweight	1.93	(.57,6.54)
Obese	1.10	(0.23,0.91)
<b>Body Size</b>		
Overweight	1.27	(.40,4.06)
Obese	14.38	(4.24,48.78)
<b>Waist Circumference</b>	10.91	(2.15,55.27)

\*\*\*Reference Group: Normal weight category

Family History of Hypertension	Odds Ratio	Confidence Interval
<b>Yes</b>		
<b>Obesity Measure</b>		
<b>BMI</b>		
Overweight	0.41	(0.11,1.46)
Obese	2.19	(0.27,17.62)
<b>Body Size</b>		
Overweight	1.19	(0.34,4.2)
Obese	0.06	(0.02,0.24)
<b>Waist Circumference</b>	25.93	(3.0,224.05)
<b>No</b>		
<b>Obesity Measure</b>		
<b>BMI</b>		
Overweight	0.85	(0.03,21.09)
Obese	0.05	(0.00,1.30)
<b>Body Size</b>		
Overweight	0.16	(0.01,3.96)
Obese	0.15	(0.01,3.76)
<b>Waist Circumference</b>	1.05	(0.05,26.22)
<b>Summary</b>		
<b>Obesity Measure</b>		
<b>BMI</b>		
Overweight	1.21	(0.25,5.83)
Obese	1.37	(0.19,6.63)
<b>Body Size</b>		
Overweight	1.24	(0.39,3.98)
Obese	0.07	(.15,67.10,365)
<b>Waist Circumference</b>	10.91	(2.15,55.27)

\*\*\*Reference Group: Normal weight category

**Conclusions**

The prevalence of hypertension (2.41%) among this group is lower than national estimates of hypertension for similar race/age group. As expected, these individuals may be healthier than the general population. Estimates of overweight and obesity differ by obesity measure. The difference in estimates of overweight and obesity obtained by BMI and Body Size may signify invalid reporting of weight and height or current body size. Individuals with a family history of hypertension have a higher rate of hypertension than those with no family history of hypertension. The odds of having hypertension is greater for obese individuals (determined by Body Size) compared to the non-obese and abdominally obese individuals compared to non-abdominally obese individuals. However, once family history of hypertension is controlled, only odds ratio of hypertension among those that are abdominally obese remains significant.

**Results cont'd**

Figure 1 shows the rates of overweight and obesity by each obesity measure. The rate of total obesity is higher for males than for females in each weight category as determined by both BMI and Body Size. Females have a higher rate of abdominal obesity compared to males as determined by waist circumference. Prevalence estimates of overweight are higher when characterized by Body Size compared to BMI and estimates of obesity are higher when characterized by BMI than when characterized Body Size. For females, the rate of obesity is 13.9 if characterized by BMI and 5.6 if determined by Body Size. For males, the rate of obesity determined by BMI and Body Size are 18.0 and 9.4 respectively.

Table 2 shows the odds ratios of hypertension by weight category for each obesity measure. The odds of a respondent having hypertension are greater if classified as obese by Body Size or Waist Circumference than non-obese (OR=14.38 (4.24,48.78) and 10.91 (2.15,55.27) respectively).

Table 3 reports the odds ratios of hypertension by weight category for those with a family history of hypertension and those with no family history of hypertension. Those with a family history of hypertension have a significant odds ratio for abdominal obesity only (OR=25.93 (3.00,224.05)). Also, the summary odds ratio for waist circumference is significant (OR=10.91 (2.15,55.27)).