Racial Disparity in the Diagnosis of Obesity among People with Diabetes

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Abstract: Studies have suggested that many of the estimated 30.5% of all adults, and 54.8% of adults with diabetes, who have a body mass index (BMI) of 30 or greater do not have a diagnosis of obesity. The records of 265 people with diabetes in the Racial and Ethnic Approaches to Community Health (REACH) 2010 Charleston community were audited for race, sex, BMI, and a documentation of obesity, to determine the likelihood of a diagnosis of obesity for people with BMI of 30 or greater, based on race and sex. Significant differences in diagnosis were observed by race, with three times as many records of obese White people with diabetes containing a diagnosis of obesity as of diabetic African Americans. Disparities in prevalence of obesity based on a BMI of 30 or greater were observed as well, with a higher proportion of African Americans meeting the criteria. Studies suggest that these disparities may contribute to the increased burden of disease experienced by African Americans with diabetes.

Key words: Diabetes, obesity, African American, health disparities.

Obesity is a serious and growing public concern. The negative impact of obesity on health outcomes is widely documented.[1–4] Using the currently accepted definition of body mass index of 30 or greater (BMI≥30.0) to define obesity, 30.5% of all adults in the U.S. are obese.[5] Health consequences of obesity appear to be a particularly severe threat to the health of people diagnosed with diabetes mellitus (DM). A recent study by the Centers for Disease Control (CDC) using data from the Third National Health and Nutrition Examination Survey (NHANES III) suggests that among the 6% of adults who have been physician-diagnosed with DM in the U.S., the prevalence of obesity is 54.8%.[6]

The prevalence of both obesity and DM appear to differ by sex and race. In the U.S., during the period 1999 to 2002, the lowest rates for obesity were among both

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non-Hispanic White (W) males and non-Hispanic African American (AfA) males (27.8%) while the highest were among African American females (48.8%). For DM, sex differences are slight, with 6.6% of males and 5.7% of females diagnosed. In contrast, the differences by race are notable. Almost 12% of African American males and females have been diagnosed with DM compared with 4.8% of White males and females.[7] No significant difference appears to exist among U.S. adults diagnosed with DM who have BMI≥30 after stratification by race, with 57.9% of Whites and 63.0% of African Americans meeting this criteria.[6]

Obesity has been shown to contribute to the frequency and severity of the comorbidities associated with DM.[8–10] Coronary heart disease (CHD) is a leading cause of mortality among people with DM. A meta-analysis conducted by Anderson and colleagues found a direct relationship between weight in adults diagnosed with DM and the risk factors for CHD, including blood pressure, high and low density lipoproteins, and triglycerides.[10] Other studies have suggested links between increased weight among people with DM and gallstones, kidney function, and other microvascular disease.[8,10–11] Even a 10% reduction in weight may significantly reduce these complications as well as improve glycemic control and insulin sensitivity.[8]

Several studies suggested that primary care providers can be effective motivators in weight reduction.[12–13] Findings from a study by Levy and Williamson suggested that individuals who were told by their physician that they were overweight were more likely to lose weight than those who were not. Of the 59% of survey participants who stated that they were told they were overweight by their provider, 51% lost weight. This is comparable to the proportion of the general population that reported participating in a formal weight loss program and losing weight, and significantly higher ($p=.009$) than the proportion who were not told they were overweight and still lost weight.[14] Further findings from a study by McArtor and colleagues suggest that documentation of obesity increases the likelihood of provider intervention. They found that when obesity was included on a problem list, clinical management activities occurred more frequently than when it was not (93% vs. 57%, $p<.0001$).[15] Other studies observed that patients with a documentation of obesity received significantly ($p<.0001$) more weight and diet counseling than those obese patients without such documentation.[16]

Despite the prevalence of obesity, the importance of weight control in the management of disease, and the impact a diagnosis of obesity can have on efforts to lose weight, a recent study based on the 1996 National Ambulatory Health Care Surveys (NAMCS) and NHANES III suggested that only 38% of obese patients had received a diagnosis of obesity.[17] In another study of family practice residents, 51.6% of their obese patients had obesity identified as a risk factor.[15] A study of the incidence of misdiagnosis of obesity using NHANES II found that physicians under-diagnosed 12.5% of obese patients.[18] In addition, the 2002 Behavioral Risk Factor Surveillance System (BRFSS) data suggest that only 42.8% of obese adults had experienced a regular health visit in which they received advice about weight and weight reduction.[19] The first goal of this study was to examine the prevalence of obesity among the people with DM in our South Carolina REACH 2010 community and compare this with national prevalence. The second goal was to observe

how well the presence of a diagnosis of obesity reflects a BMI≥30 and to observe if sex or race (African American or White) is related to this.

Racial and Ethnic Approaches to Health 2010 Charleston/Georgetown County Diabetes Coalition (REACH 2010) is a Centers for Disease Control and Prevention (CDC) funded project with the primary aim of eliminating health care disparities among African Americans with DM in the two South Carolina counties, Charleston and Georgetown. A telephone survey conducted in 2002 found that 14.3% of African Americans in those two counties had been diagnosed with DM compared with 10.9% of African Americans in South Carolina and 12.4% nationally. In contrast, the prevalence of DM among Whites in South Carolina is 7.5%.[20] Age-adjusted mortality rates associated with DM are also higher in African Americans than in Whites.[21] As part of the effort to reduce this disparity, medical record audits are conducted annually on people with a diagnosis of DM seen at least once in the four facilities associated with REACH 2010.

Methods

This study is a secondary analysis of data collected from non-pregnant adult (18 years old or older) patient records for visits during the period between January 1, 2003 and March 31, 2004. With Institutional Review Board approval from the Medical University of South Carolina; a stratified random sample of 334 charts of people with DM was selected from records of four health care facilities associated with REACH 2010 in Charleston County, South Carolina. Each of the four facilities was sampled in proportion to its patient load. All the facilities are community health centers. Three of the four have similar demographics, primarily African American, while the fourth is primarily White. Among the data collected were information on sex, race, age, weight, height, and any documented comorbidities, including obesity. The extraction of data from the medical records was conducted by trained medical reviewers and the mean inter-rater reliability on categorical variables was .96 (range .88 to 1.00).

Body mass index was computed for all subjects with recorded height and weight. Subjects were classified as obese (BMI≥30.0) based on currently accepted standards.[22] A diagnosis of obesity was recorded as present if there was any mention of obesity in the patient record. Frequency distributions were used to describe the sample. The Student's t test was used to compare mean BMI, mean BMI for those with a diagnosis of obesity, and mean BMI for those without, by race. Relative risk (RR) and the chi-square test statistic (Chi Sq) were used to compare the likelihood of a diagnosis of obesity in the presence of a BMI≥30, based on race and sex. The sensitivity and specificity of the documentation of obesity were also calculated both before and after stratification by race and sex.

Results

Table 1 describes the sample before and after stratification by race. Height and weight, needed to calculate BMI, were available for 265 records. Of these, 167 (63%)

Table 1.

SAMPLE CHARACTERISTICS BEFORE AND AFTER STRATIFICATION BY RACE

	All (N=265)	AfA (n=174)	W (n=91)
Sex (% female)	63	70	52
% Obese by diagnosis	26	24	30
% Obese by BMI	55	70	27
Mean age	56	58.5	51.2
Median number of visits	4	4	4

were female, 98 (37%) were male, and 174 (66%) were African American, with the remaining 91 (34%) White. The mean age of the sample was 56 years old with a range from 21 to 98. Mean BMI was 31.4 and a slight majority of subjects 147 (55%) had BMI≥30. Obesity was documented in the records of 68 patients (26%) independent of BMI status. There are significant differences between African Americans and Whites for age, sex, diagnosis of obesity, and percent obese by BMI.

Table 2 lists the mean BMI, the mean BMI for those with a diagnosis of obesity, and the mean BMI for those without, after stratification by sex and race. It also lists the p value associated with t tests of race for both males and females. African American females had the highest overall BMI (34.5). For both male and female African Americans, the mean BMI, as well as the mean BMI for those not diagnosed with obesity, were significantly greater than the mean BMI for Whites. They were also greater than the standard measure of obesity, BMI≥30.0.

Table 3 lists the number and percent obese based on BMI≥30, the number and percent obese based on the presence of a diagnosis, and the sensitivity and specificity of the diagnosis of obesity, before and after stratification by race and sex. As

Table 2.

MEAN BMI BY RACE AFTER STRATIFICATION BY SEX

Sex	Males (N=98)			Females (N=167)		
Race	AfA Male (n=52)	W Male (n=46)	P value	AfA Female (n=122)	W Female (n=45)	P value
Mean BMI	31.1	27.9	.003	34.5	27.4	<.0001
Mean BMI with documented obesity	36.8	35.5	.706	41.4	31.9	.0006
Mean BMI without documented obesity	30.2	27.4	.007	31.8	26.7	<.0001

Table 3.

SENSITIVITY AND SPECIFICITY OF THE DIAGNOSIS OF OBESITY, BY RACE AND GENDER

	Obese per BMI n (%)	Obese per diagnosis n (%)	Sensitivity	Specificity
All	147 (55)	68 (26)	44%	97%
Race				
AfA	122 (70)	41 (24)	32%	96%
W	25 (27)	27 (30)	100%	97%
Gender				
Male	44 (45)	19 (19)	41%	98%
Female	103 (62)	45 (27)	41%	95%

stated earlier, 55% of the total sample were obese per BMI. The disparity by race is especially noteworthy. While 70% of the African Americans in this sample met the criteria for obesity, only 27% of the Whites met those same criteria. There was also a disparity by sex, with 62% of females compared with 45% of males having a BMI≥30. The percent diagnosed did not match this pattern. Sensitivity is the ability of a test (or in this case diagnosis) to identify true positives, or people who actually have the disease (in this case obesity). Among this sample, the diagnosis of obesity in patient records only captures 44% of the people with BMI≥30. That means that 56% of people with BMI≥30 in this sample do not have any documentation of obesity. After stratification by race, only 32% of African Americans with BMI≥30 have a documentation of obesity, while all Whites with BMI≥30 have the diagnosis. No differences in sensitivity were observed based on sex. Specificity is the proportion of people with BMI<30 without a diagnosis of obesity. All levels of stratification had a specificity ≥95%.

Discussion

Our first goal was to examine the prevalence of obesity among the people with DM in our South Carolina REACH 2010 community and compare this with national levels. We found that 55% of the patients with DM in our four health facilities were obese based on a BMI≥30. This is comparable to the 54.8% suggested by NHANES III. This is not true when our rates are compared with national rates after stratification by race. At the national level, there is no significant difference in rates of obesity based on race, while in our sample 70% of African American have BMI≥30 compared with 27% of Whites.[6] The reasons for this are not clear and are beyond the scope of the current study.

Our second goal was to observe how well the presence of a diagnosis of obesity reflects a BMI≥30 and to observe if sex or race (African American or White) was related to this. While several other studies found that sex is related to a diagnosis of obesity, we found no difference based on sex alone.[18,23] In this sample of the REACH 2010 population, there was a significant disparity in the diagnosis of obesity associated with race among those with BMI≥30. Whites were 3 times more likely to have a diagnosis of obesity in the presence of BMI≥30 ($p<.0001$). Other studies conducted among all adults, not just those with DM, did not find this level of racial disparity.[18,23] Whether this is related to differences in our community or differences based on the presence of DM is not clear. As there have been no other studies to date to address under-diagnosis of obesity among people with DM, stratified by race, it is not possible to compare our results to determine if this disparity is unique to our community. Further, while we found that the diagnosis of obesity was highly specific across all levels of stratification, it was only highly sensitive for Whites.

The results of this study do support previous observations of under-diagnosis of obesity in a clinical setting.[16,18,23–24] Among the adults in our sample with BMI≥30, 44% had a diagnosis of obesity. This is higher than the 38% suggested by NHANES III, lower than the 51.6% suggested by the study by McArtor and colleagues, and comparable to the 42.8% suggested by the 2002 BRFSS report.[15,17,19] An important difference is that our study only examined records of people with DM who are at higher risk of complications related to obesity. Clinicians should be more vigilant in identifying the additional risk of obesity among those already diagnosed with DM. Yet a study by Lemay and colleagues found no difference in the rate of diagnosis of obesity related to a diagnosis of DM.[24]

Our results are also comparable to results from studies examining the relationship of mean BMI to the diagnosis of obesity.[16,18,24] Regardless of race or sex, the BMI of adults diagnosed with obesity was higher than the BMI of those not diagnosed. A proposed explanation for this is that clinicians' perceptions may have more influence on the documentation of obesity than more objective measures.[16,18,24]

It is not clear why under-diagnosis of obesity remains so common, though several studies have suggested explanations. A study by Lyznicki and colleagues suggested the following barriers to clinicians evaluation of obesity: lack of reimbursement, lack of time, lack of recognition of obesity as a serious condition, lack of confidence in the effectiveness of available treatments, and lack of patient readiness for intervention, as well as negative or unsympathetic perceptions that obesity represents a lack of discipline.[25] Others have suggested that the degree of adiposity in the patient or the physician's personal standard for ideal weight may influence the diagnosis of obesity.[16] Additional barriers have been proposed for clinicians treating people with DM. These include the perceived increased difficulty in losing weight based on genetic or metabolic differences, fear of hypoglycemia, contraindications with medications, limited physical mobility, and diet fatigue. Clinicians may also experience a growing frustration related to prior failures or a reluctance to recommend the therapies used by non-diabetic individuals.[10]

Other studies have not suggested why African Americans with DM are more

likely than Whites to be under-diagnosed. It is possible that some of the barriers already listed may apply more to African Americans than to Whites with DM. Anecdotal evidence, cited by REACH 2010 community health advocates, suggests that African Americans may be more offended than Whites by any discussion of their weight. This was not supported in a study by Wadden and colleagues concerning obese women and their responses to physician's weight management attitudes and practices. The only significant difference in responses based on race was that White women were more likely to respond that they could not speak with their physician about their weight.[26] Kumanyika and Ewert suggest that African Americans have more difficulties losing weight related to financial limitations, cultural influences, and the disparate burden of disease.[27] Whether this may make clinicians more reluctant to diagnose obesity among African Americans is not clear.

This study elucidates an important and previously undocumented disparity in the health care of African Americans with DM compared with non-Hispanic Whites. In our sample, African Americans were significantly less likely than non-Hispanic Whites to have a documented diagnosis of obesity, though they were more likely to be obese based on BMI. Given the evidence provided in the introduction on the importance of documentation of obesity to its treatment and the importance of weight loss in the management of DM, this disparity may help explain the difference in health outcomes, based on race, that we have traditionally observed in our community.

While this study identifies important racial differences in the documentation of obesity, it has several limitations. Our use of BMI as a gold standard for identification of obesity was based on common practice and the data we had available but may not have been the best measure to use in a study of this type. Sonmez and colleagues compared the use of BMI, waist circumference, and waist-to-hip ratio, in determining obesity among patients with coronary artery disease. They found that the rate of people diagnosed with obesity by BMI was lower than that of those diagnosed using either waist circumference or waist-to-hip ratio. They further suggested that waist circumference may be the best way to identify obesity.[28] Given these findings we may have under-estimated the problem.

Sixty-nine records were excluded from this study for missing data on height, which is necessary to calculate BMI. Ninety-three percent of the patients missing this information are African American, compared with 66% African Americans overall. This suggests that there may be a racial disparity in the recording of the information necessary to calculate BMI. Other than race there were no significant differences observed between the excluded and included records. As none of the excluded records had a diagnosis of obesity it is unlikely that the missing data would have affected our results.

An additional limitation is our inability, due to the differences in our health facility populations, discussed earlier, to separate the effect of site of care from race on the documentation of obesity. Future studies including a health facility with a more diverse population could help to clarify this; however we do not have such a facility available to us at this time.

In this study we had no data on the race and sex of the clinicians involved in patient care. Future studies might examine this in relation to diagnosis patterns.

As low SES may also be related to under-diagnosis, it would be helpful to have these data as well. The current IRB approval does not allow collection of information on SES and SES is not easily determined, but this information would also help to clarify the role of race in both the presence of obesity and the under-diagnosis of obesity as opposed to SES.

Finally, we defined the diagnosis of obesity as a mention of obesity anywhere in the patient's medical record. This is a proxy for the more important issue of physician recognition and management of the problem. The absence of the diagnosis of obesity is not proof that clinicians failed to address the issue of obesity, just that they failed to document it. Likewise, the presence of documentation does not establish the discussion or management of the problem. Future studies using triangulated data from patient's records, surveys, and focus groups, as well as clinician surveys and focus groups could elucidate any discrepancies between what was documented and what was done.

Conclusions

Based on our results we have concluded that there is under-diagnosis of obesity among the people with DM in our REACH 2010 community. Further, we believe that there exists racial disparity in both the prevalence of obesity and its diagnosis. Results of other studies suggest that these disparities may contribute to the increased burden of disease experienced by African Americans with diabetes in Charleston and Georgetown counties.

The reduction of disparities is a primary focus of the REACH 2010 initiative. As part of REACH 2010, it is our mission to suggest interventions to help in this effort. Several interventions have been proposed in response to the results of this study. These include education of both clinicians and patients in the importance of weight loss in the management of DM, the inclusion of a BMI chart in every patient record, and BMI charts prominently displayed in all patient areas in our affiliated facilities. Efforts will be made to encourage the discussion of weight between clinician and people with diabetes, even if this discussion must be initiated by the patient. Future planned chart audits will provide data to continue evaluation of this problem and to monitor any progress resulting from these initial interventions. Planned focus groups and surveys among both clinicians and people with diabetes will be used to further clarify the problem and propose other interventions.

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Notes

1. Anderson JW, Konz EC. Obesity and disease management: effects of weight loss on comorbid conditions. Obes Res. 2001 Nov;9(Suppl 4):326S–334S.
2. Rippe JM, McInnis KJ, Melanson KJ. Physician involvement in management of obesity as a primary medical condition. Obes Res. 2001 Nov;9(Suppl 4):302S–311S.
3. Anonymous. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults—the evidence report. National Institutes of Health. Obes Res. 1998 Sep;6(Suppl 2):51S–209S.
4. Garrow J. Importance of obesity. BMJ. 1991 Sep 21;303(6804):704–6.
5. Flegal KM, Carroll MD, Ogden CL, et al. Prevalence and trends in obesity among U.S. adults, 1999–2000. JAMA. 2002 Oct 9;288(14):1723–7.
6. Centers for Disease Control and Prevention (CDC). Prevalence of overweight and obesity among adults with diagnosed diabetes—United States, 1998–1994 and 1999–2002. MMWR Morb Mortal Wkly Rep. 2004 Nov 19;53(45):1066–8.
7. National Center for Health Statistics. Health, United States, 2004, with chartbook on trends in the health of Americans. (DHHS Pub. No. (PHS) 2004-1232.) Hyattsville, MD: U.S. Public Health Service, 2005.
8. Pacchioni M, Nicoletti C, Caminiti M, et al. Association of obesity and type II diabetes mellitus as a risk factor for gallstones. Dig Dis Sci. 2000 Oct;45(10):2002–6.
9. Sundell J. Obesity and diabetes as risk factors for coronary artery disease: from the epidemiological aspect to the initial vascular mechanisms. Diab Obes Metab. 2005 Jan;7(1):9–20.
10. Anderson JW, Kendall CW, Jenkins DJ. Importance of weight management in type 2 diabetes: review with meta-analysis of clinical studies. J Am Coll Nutr. 2003 Oct; 22(5):331–9.
11. Pi-Sunyer FX. Weight and non-insulin-dependent diabetes mellitus. Am J Clin Nutr. 1996 Mar;63(3 Suppl):426S–429S.
12. Kreuter MW, Chheda SG, Bull FC. How does physician advice influence patient behavior? Evidence for a priming effect. Arch Fam Med. 2000 May;9(5):426–33.
13. Bull FC, Jamrozik K. Advice on exercise from a family physician can help sedentary patients to become active. Am J Prev Med. 1998 Aug;15(2):85–94.
14. Levy BT, Williamson PS. Patient perceptions and weight loss of obese adults. J Fam Pract. 1988 Sep;27(3):285–90.
15. McArtor RE, Iverson DC, Benken D, et al. Family practice residents' identification and management of obesity. Int J Obes Metab Disord. 1992 May;16(5):335–40.
16. Logue E, Gilchrist V, Bourguet C, et al. Recognition and management of obesity in a family practice setting. J Am Board Fam Pract. 1993 Sep-Oct;6(5):457–63.
17. Stafford RS, Farhat JH, Misra B, et al. National patterns of physician activities related to obesity management. Arch Fam Med. 2000 Jul;9(7):631–8.
18. Eck LH, Ray JW, Klesges RC, et al. Physicians' diagnosis of obesity status in NHANES II. Int J Obes Relat Disord. 1994 Oct;18(10):704–8.
19. Galuska DA, Will JC, Serdula MK, et al. Are health care professionals advising obese patients to lose weight? JAMA. 1999 Oct 27;282(16):1576–8.
20. Liao Y, Tucker P, Okoro CA, et al. REACH 2010 surveillance for health status in minority communities—United States, 2001–2002. MMWR Surveill Summ. 2004 Aug;53(6):1–36.

21. National Center for Health Statistics. National vital statistics system 2003. (DHHS Pub. no. (PHS) 2004-1120.) Hyattsville, MD: U.S. Public Health Service, 2004.
22. World Health Organization (WHO). Obesity: preventing and managing the global epidemic. Report of a WHO consultation of obesity. World Health Organ Tech Rep Ser. 2000;894:i–xii, 1–253.
23. Lopez-Jimenez F, Malinski M, Gutt M, et al. Recognition, diagnosis and management of obesity after myocardial infarction. Int J Obes (Lond). 2005 Jan;29(1):137–41.
24. Lemay C, Cashman S, Savageau J, et al. Underdiagnosis of obesity at a community health center. J Am Board Fam Pract. 2003 Jan-Feb;16(1):14–21.
25. Lyznicki JM, Young DC, Riggs JA. Obesity: assessment and management in primary care. Am Fam Phys. 2001 Jun 4;63(11):2185–96.
26. Wadden TA, Anderson DA, Foster GD, et al. Obese women's perceptions of their physicians' weight management attitudes and practices. Arch Fam Med. 2000 Oct; 9(9):854–60.
27. Kumanyika SK, Ewert CK. Theoretical and baseline considerations for diet and weight control of diabetes among blacks. Diabetes Care. 1990 Nov;13(11):1154–62.
28. Sonmez K, Akcakoun M, Akcay A, et al. Which method should be used to determine the obesity, in patients with coronary artery disease? (body mass index, waist circumference, or waist-hip ratio). Int J Obes. 2003 Mar;27(3):341–6.