Metabolic Syndrome in Obese Patients With Binge-Eating Disorder in Primary Care Clinics: A Cross-Sectional Study

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Background: The distribution and nature of metabolic syndrome in obese patients with binge-eating disorder (BED) are largely unknown and require investigation, particularly in general internal medicine settings. The objectives of this study were to (1) examine the frequency of metabolic syndrome and (2) explore its eating- and weight-related correlates in obese patients with BED.

Method: This was a cross-sectional analysis of 81 consecutive treatment-seeking obese (body mass index ≥ 30 kg/m^2) patients (21 men, 60 women) who met *DSM-IV-TR* research criteria for BED (either subthreshold criteria: ≥ 1 binge weekly, n = 19 or full criteria: ≥ 2 binges weekly, n = 62). Participants were from 2 primary care facilities in a large university-based medical center in an urban setting. Patients with and without metabolic syndrome were compared on demographic features and current and historical eating- and weight-related variables. Data were collected from December 2007 through March 2009.

Results: Forty-three percent of patients met criteria for metabolic syndrome. A significantly higher proportion of men (66%) than women (35%) met criteria for metabolic syndrome ($P = .012$). Patients with versus without metabolic syndrome did not differ significantly in ethnicity or body mass index. Patients with versus without metabolic syndrome did not differ significantly in binge-eating frequency, severity of eating disorder psychopathology, or depression. Analyses of covariance controlling for gender revealed that patients without metabolic syndrome started dieting at a significantly younger age ($P = .037$), spent more of their adult lives dieting ($P = .017$), and reported more current dietary restriction ($P = .018$) than patients with metabolic syndrome.

Conclusions: Metabolic syndrome is common in obese patients with BED in primary care settings and is associated with fewer dieting behaviors. These findings suggest that certain lifestyle behaviors, such as increased dietary restriction, may be potential targets for intervention with metabolic syndrome.

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The prevalence of obesity has reached epidemic proportions, with more than 1 in 3 adults in the United States considered obese (body mass index [BMI] ≥ 30 kg/m^2).[1] Degree of obesity is directly associated with metabolic syndrome, a cluster of vascular risk factors that increase the risk of cardiovascular disease, including hypertriglyceridemia, low serum high-density lipoprotein (HDL) cholesterol level, hypertension, elevated fasting blood glucose, and central adiposity.[2,3] Metabolic syndrome is a major risk factor for cardiovascular disease, type II diabetes, and all-cause mortality[4–6]; has a significant negative impact on patients' health-related quality of life[7]; and represents a growing health care economic burden in the United States.[8]

As rates of obesity have increased, so too has the prevalence of metabolic syndrome, with an estimated rate of 24% in the US population.[9] Among obese individuals, rates of metabolic syndrome are much higher, with 50% of women and nearly 60% of men meeting criteria for metabolic syndrome.[10] Significant ethnic differences also are present in the prevalence of metabolic syndrome. The age-adjusted prevalence of metabolic syndrome in the United States is 24.8% for men and 22.8% for women among whites, is 16.4% for men and 25.7% for women among blacks, and is highest among Hispanics (28.3% for men and 35.6% for women).[9]

Obesity is a heterogeneous problem with complex causes.[11,12] Research has highlighted the particular clinical importance of a specific subgroup of obese persons who have binge-eating disorder (BED).[13] BED is characterized by recurrent episodes of binge eating (overeating while experiencing a subjective loss of control) without inappropriate compensatory behaviors. BED is strongly associated with increased severity of obesity and with heightened risk for psychiatric and medical problems.[13] In addition to binge eating and greater associated psychopathology,[14,15] obese individuals with

Clinical Points

- Metabolic syndrome is common in obese patients with binge-eating disorder (BED) in primary care settings.
- It is important that primary care providers have open discussions with their obese patients regarding their excess weight and indicate that there are specific pharmacologic and behavioral treatments with demonstrated effectiveness for BED.
- Preliminary evidence suggests that time spent dieting may buffer the development of metabolic syndrome within obese individuals with BED.

BED differ significantly from their non-BED counterparts in their non–binge-eating patterns and behaviors.[16]

Little is known about the relationship of specific eating behaviors/patterns characteristic of BED to metabolic syndrome. Research has found that certain eating behaviors associated with metabolic abnormalities are similar to some of the features characteristic of BED. For example, eating large amounts of food in a discrete period of time is associated with increased fasting glucose levels, exaggerated insulin secretion, elevated serum lipids, and decreased glucose tolerance.[17,18] Eating rapidly is associated with higher waist-hip circumference ratio, elevated serum lipids, and fatty liver in obese individuals.[19] In addition, irregular meal patterns are associated with metabolic syndrome in the general population.[20]

To date, only 3 published studies have investigated metabolic syndrome in obese persons with BED. The first study[21] compared obese men and women with BED seeking weight loss treatment and found that 32% of participants met criteria for metabolic syndrome. This initial study, however, did not examine correlates of metabolic syndrome; moreover, the observed rate (32%) of metabolic syndrome was much lower than is generally found in obese populations.[10]

The second study[22] found that 60% of obese patients seeking treatment for BED at a university-based research clinic met criteria for metabolic syndrome. Metabolic syndrome was significantly associated with fewer episodes of weight cycling (defined as intentional weight loss of ≥ 20 lb followed by weight regain) and regular meal skipping.[22] Most recently, Hudson and colleagues[23] followed a group of overweight and obese individuals with and without BED over a 5-year period and assessed metabolic syndrome components. Those with BED were significantly more likely than those without BED to self-report new diagnoses of metabolic syndrome components (eg, dyslipidemia, hypertension) at follow-up. Hudson and colleagues[23] concluded that BED may confer added risk for metabolic abnormalities independent of overweight/obesity.

Given the limited data on metabolic abnormalities in obese persons with BED, as well as the large discrepancies in reported rates of metabolic syndrome in previous studies, more research is needed to understand metabolic syndrome in BED. This research needs to be performed in general medical settings such as primary care clinics for several important reasons. Although obese patients with BED report greater medical concerns compared to obese non–binge eaters[24] and are believed to be high utilizers of primary care facilities,[25] research has found that primary care providers are unfamiliar with BED[26] and frequently overlook this condition.[25] There also is evidence suggesting that those with BED who present to primary care clinics may differ from those who present to specialty research clinics.[27] Thus, the present study examined the frequency of metabolic syndrome in obese patients with BED recruited in primary care settings and extends previous work by exploring demographic and eating- and weight-related behavioral and psychological correlates of metabolic syndrome in this specific subgroup of obese persons.

METHOD

Participants

Participants were a consecutive series of 81 (21 men, 60 women) obese (BMI ≥ 30 kg/m^2) patients who met *DSM-IV-TR*[28] research criteria for BED (either subthreshold criteria: ≥ 1 binge weekly, n = 19 or full criteria: ≥ 2 binges weekly, n = 62) from 2 primary care facilities in a large university-based medical center in an urban setting. Participants with subthreshold and full BED were included to be consistent with anticipated *DSM-5* BED criteria. This change reflects considerable research that has found subthreshold individuals generally do not differ significantly from individuals with full BED.[29–31] The mean age of patients was 43.2 years (SD = 11.6), and 72.8% of patients attended at least some college. The mean BMI was 38.3 (SD = 6.7). The majority of patients identified themselves as white (45.7%), 33.3% identified as black, 13.6% identified as Hispanic, 4.9% identified as Asian, 1.2% identified as Native American, and 1.2% identified as biracial.

Procedures

Participants were recruited from primary care facilities via physician referrals and by flyers posted in

primary care clinics seeking overweight persons who wanted to "stop binge eating and lose weight." Participants were eligible for the study if they reported binge eating regularly at least once weekly and met BMI criteria of 30–50 kg/m^2. Exclusion criteria included current significant psychiatric diagnosis (eg, bipolar disorder, schizophrenia), uncontrolled hypertension, cardiac issues broadly defined, significant neurologic history, regular use of purging behaviors, and current use of psychoactive medications that are contraindicated with sibutramine (one of the treatments being tested) such as selective serotonin reuptake inhibitor (SSRI) antidepressants.

Study procedures were approved by the institutional review board, and all participants provided written informed consent. Data were collected from December 2007 through March 2009. Patients completed self-report questionnaires and then were interviewed by experienced and trained doctoral-level research clinicians. BED diagnoses were determined using the Structured Clinical Interview for *DSM-IV* Axis I Disorders.[32] Patients were categorized as having metabolic syndrome if they had 3 or more of the 5 criteria outlined by the National Cholesterol Education Program's Adult Treatment Panel III guidelines[2]: (1) abdominal obesity: waist circumference > 40 inches (102 cm) in men and > 35 inches (88 cm) in women, (2) hypertriglyceridemia: ≥ 150 mg/dL (1.7 mmol/L), (3) low HDL cholesterol: < 40 mg/dL (1.03 mmol/L) in men and < 50 mg/dL (1.30 mmol/L) in women, (4) hypertension: ≥ 130 mm Hg systolic or ≥ 85 mm Hg diastolic, or (5) high fasting glucose: ≥ 110 mg/dL (6.1 mmol/L).

Measures

Physical and metabolic functioning. Fasting lipid profile (total cholesterol, HDL), low-density lipoprotein (LDL), glucose levels, and hemoglobin A1c (HbA1c) were obtained and analyzed by Quest Diagnostics (Madison, New Jersey). Patients' height and weight were measured using a medical balance beam scale. Patients wore light clothing and were asked to remove their shoes. Waist circumference and blood pressure were measured by trained research staff.

The Eating Disorder Examination[33] is a semistructured investigator-based interview that assesses eating disorders. The Eating Disorder Examination focuses on the previous 28 days, except for the diagnostic items that are rated per the durations stipulated in the *DSM-IV-TR*.[28] The Eating Disorder Examination assesses the frequency of different forms of overeating, including objective bulimic episodes (defined as unusually large quantities of food with a sense of loss of control). The Eating Disorder Examination also comprises 4 subscales: dietary restraint, eating concern, weight concern, and shape concern and an overall global score. The items for the 4 Eating Disorder Examination subscales are rated on a 7-point forced-choice format (0–6), with higher scores reflecting greater severity or frequency. Regular meal skipping was defined as consumption of any meal less than or equal to half of the time (ie, Eating Disorder Examination score ≤ 3), and participants were dichotomized as regular meal skippers or nonskippers. The Eating Disorder Examination has demonstrated good interrater and test-retest reliability in diverse patient groups, including BED.[34]

Weight and eating history. Doctoral-level research clinicians administered a structured clinical interview to determine current and historical obesity-related variables of interest. Participants' onset of dieting was determined by asking, "At what age do you remember first going on a diet?" Participants' frequency of dieting was assessed by asking, "Approximately how many diets, which have lasted at least 3 consecutive days, have you been on, whether or not you have succeeded?" Onset of binge eating was determined by asking, "At what age do you remember first binge eating on a regular basis—at least 1 time per week?" Participants were asked to estimate their highest and lowest adult weight and to provide the age at which this occurred.

The Questionnaire for Eating and Weight Patterns-Revised (QEWP-R)[35] is a self-report measure that was used to assess age at overweight onset, weight cycling (number of times lost and regained ≥ 20 lb), and frequency of dieting ("Since you have been an adult—18 years old—how much of the time have you been on a diet, been trying to follow a diet, or in some way been limiting how much you were eating in order to lose weight or keep from regaining weight you had lost?").

The Beck Depression Inventory (BDI)[36] is a 21-item scale that assesses current depression level and symptoms of depression. It is a widely used and well-established measure with excellent reliability and validity.[37] Higher scores reflect higher levels of depression and, more broadly, negative affect and are an efficient marker for broad psychopathology.[38]

The Three-Factor Eating Questionnaire-Restraint subscale (TFEQ-Restraint) consists of 21 items that assess purposeful monitoring and attempted reduction of food intake. The TFEQ-Restraint has received some psychometric support including good internal consistency.[39]

Data analyses. Participants with and without metabolic syndrome were compared on baseline characteristics using *t* tests for continuous variables and χ^2 analyses for categorical variables. Analyses of covariance and effect sizes were used to examine group differences on historical and behavioral correlates while controlling for gender.

RESULTS

Descriptive Characteristics

Thirty-five (43.2%) of the 81 patients met Adult Treatment Panel III criteria for metabolic syndrome. As

Table 1. Baseline Characteristics of Treatment-Seeking Obese Patients With Binge-Eating Disorder With and Without Metabolic Syndrome Recruited From Primary Care Centers[a,b]

Characteristic	No Metabolic Syndrome (n = 46, 56.8%)	Metabolic Syndrome (n = 35, 43.2%)	*P* Value
Gender, n (%)			
Women	39 (84.8)	21 (60.0)	.012
Men	7 (15.2)	14 (40.0)	
Ethnicity, n (%)			
Black	18 (40.9)	9 (29.0)	.573
White, Hispanic	6 (13.6)	5 (16.1)	
White, non-Hispanic	20 (45.5)	17 (54.8)	
Education, n (%)			
Some high school	6 (13.0)	2 (5.7)	.520
High school or general education development	6 (13.0)	8 (22.9)	
Some college/associate of arts degree	16 (34.8)	11 (31.4)	
College graduate/postgraduate	18 (39.1)	14 (40.0)	
Age, y	42.26 (11.44)	44.49 (11.89)	.397
Body mass index, kg/m^2	38.32 (7.79)	38.29 (4.90)	.985
Waist circumference, in	43.89 (6.03)	45.91 (4.39)	.097
Low-density lipoprotein cholesterol, mg/dL	100.52 (27.14)	109.43 (38.61)	.226
High-density lipoprotein cholesterol, mg/dL	59.65 (15.78)	42.94 (9.57)	< .0005
Triglycerides, mg/dL	94.15 (42.29)	157.60 (78.74)	< .0005
Systolic blood pressure, mm Hg	124.76 (15.99)	136.12 (16.48)	.002
Diastolic blood pressure, mm Hg	77.50 (9.44)	86.58 (11.24)	< .0005
Heart rate, bpm	72.30 (11.08)	76.66 (10.40)	.076
Glucose, mg/dL	93.50 (10.85)	124.37 (41.40)	< .0005
Hemoglobin A1c, %	5.55 (0.44)	6.50 (1.26)	< .0005

[a]Values are means and standard deviations (unless otherwise specified) based on *t* tests for continuous variables and χ^2 analyses for categorical variables.
[b]Ethnicity analyses contain data only from black, white non-Hispanic, and white Hispanic participants due to small numbers of other ethnic groups in this sample.

Table 2. Eating and Weight History Variables in Treatment-Seeking Obese Patients With Binge-Eating Disorder With and Without Metabolic Syndrome Recruited From Primary Care Centers[a]

Variable	No Metabolic Syndrome (n = 46, 56.8%)	Metabolic Syndrome (n = 35, 43.2%)	*P* Value	Partial η^2
Age at overweight onset, y	18.08 (11.09)	19.16 (10.45)	.788	0.001
Age at binge-eating onset, y	23.52 (12.40)	27.89 (12.22)	.197	0.021
Age at dieting onset, y	20.84 (9.07)	26.77 (11.50)	.037	0.059
Weight cycling[b]	2.76 (1.06)	2.43 (1.04)	.081	0.039
Highest adult body mass index, kg/m^2	41.49 (11.41)	39.91 (5.87)	.582	0.004
Lowest adult body mass index, kg/m^2	24.70 (4.79)	26.39 (5.41)	.158	0.026
Dieting frequency[c]	3.22 (1.30)	2.42 (1.30)	.017	0.073

[a]Values are means and standard deviations based on analyses of covariance that controlled for gender.
[b]Number of times reported.
[c]Response to 1 Likert scale question.

expected on the basis of the definitions for metabolic syndrome, patients with versus without metabolic syndrome differed significantly on HDL cholesterol, triglycerides, blood pressure, fasting glucose, and HbA1c (Table 1). The 2 groups did not differ significantly on waist circumference, LDL cholesterol, or heart rate.

Table 1 summarizes demographic and clinical characteristics of the participants. Metabolic syndrome differed significantly by gender, with men (66%) having higher rates of metabolic syndrome than women (35%). Metabolic syndrome was not significantly associated with age, ethnicity, education, or BMI. Although the overall distribution of metabolic syndrome did not differ significantly by ethnicity, we note that among black participants, only 33% (n = 9 of 27) met criteria for metabolic syndrome compared to 45% (n = 5 of 11) among Hispanic participants and 46% (n = 17 of 37) among white participants.

Eating and Weight History

Table 2 summarizes the means and standard deviations for eating and weight history variables. Analyses of covariance (ANCOVA) revealed that, after controlling for gender, patients with metabolic syndrome started dieting at a significantly older age and spent less of their adult lives dieting than

Table 3. Current Eating Behavior and Global Functioning Variables in Treatment-Seeking Obese Patients With Binge-Eating Disorder With and Without Metabolic Syndrome Recruited From Primary Care Centers[a]

Variable	No Metabolic Syndrome (n = 46, 56.8%)	Metabolic Syndrome (n = 35, 43.2%)	*P* Value	Effect Size
Eating behavior				
Eating Disorder Examination score				
Global	2.59 (1.06)	2.47 (0.95)	.648	0.003
Restraint	1.81 (1.28)	1.58 (1.27)	.363	0.011
Eating concerns	1.95 (1.41)	1.79 (1.11)	.668	0.002
Weight concerns	3.23 (1.28)	3.27 (1.15)	.711	0.002
Shape concerns	3.31 (1.30)	3.23 (1.41)	.916	0.000
Objective bulimic episodes in past mo	17.04 (14.44)	15.03 (10.73)	.437	0.008
Objective bulimic episode days 6-mo average	2.92 (1.62)	3.04 (1.86)	.935	0.000
Meal skipping, n (%)[b]	23 (50.0)	21 (60.0)	.371	0.099
TFEQ-Restraint score	8.15 (4.56)	5.65 (3.19)	.018	0.070
Global functioning				
Beck Depression Inventory score	15.04 (9.70)	15.69 (11.71)	.617	0.003

[a]Values are means and standard deviations (unless otherwise specified) based on analyses of covariance that controlled for gender.
[b]Results based on χ^2 analyses; effect size is reported as Φ.
Abbreviation: TFEQ-Restraint = Three-Factor Eating Questionnaire-Restraint subscale.

those without metabolic syndrome. Patients with versus without metabolic syndrome did not differ significantly on age at onset for obesity or binge eating, weight cycling, or highest or lowest adult BMI.

Current Eating Behavior and Depressive Symptomatology

Table 3 presents current eating behavior and symptoms of depression. ANCOVAs revealed that, after controlling for gender, patients with metabolic syndrome reported significantly lower levels of restraint (TFEQ-Restraint) than those without metabolic syndrome. There were no significant differences between the 2 groups for the Eating Disorder Examination global scale and subscales, binge-eating frequency, meal skipping, or symptoms of depression (BDI).

DISCUSSION

This study, to our knowledge, is the first to examine metabolic syndrome within an obese BED patient group recruited from primary care settings and represents only the second study to explore demographic and eating- and weight-related behavioral and psychological correlates of metabolic syndrome in this subgroup. Thus, this study provides new clinical information about a subgroup of obese patients who binge eat and are at high risk for metabolic syndrome that is relevant to physicians and health care professionals in general internal medicine and primary care practices. As anticipated, patients with and without metabolic syndrome differed significantly on 4 of the 5 markers of metabolic syndrome as delineated by the National Cholesterol Education Program's Adult Treatment Panel III guidelines.[2] In total, 43.2% of patients met criteria for metabolic syndrome, with men being significantly more likely to be diagnosed with metabolic syndrome than women. Although the distribution of metabolic syndrome did not differ significantly by ethnicity, blacks showed a nonsignificant trend to have lower rates of metabolic syndrome (33%) than Hispanic (45%) and white (46%) participants. Although few significant differences were observed on historical eating/weight variables, current eating disorder psychopathology, and depressive symptoms, individuals without metabolic syndrome started dieting at a significantly younger age, spent more of their adult lives dieting, and reported more current eating-related restraint than those with metabolic syndrome. These findings and their implications are briefly addressed here.

An improved understanding of the frequency and correlates of metabolic syndrome in obese patients with BED is particularly important in light of recent longitudinal findings that this specific subgroup may be at heightened risk for the development over time of metabolic syndrome components.[23] The overall 43.2% rate of metabolic syndrome observed falls between the 2 previous reports (23%[21] and 60%[22]) for BED patients assessed at specialty clinics. The observed rate of metabolic syndrome in our participants is slightly lower than that reported in a community-based study of obese persons.[10] It is possible that this might reflect in part our recruitment from primary care settings wherein presumably patients have received medical interventions from their primary care physicians for some of the components comprising metabolic syndrome. Alternatively, the fact that 43.2% of participants recruited from primary care settings meet current criteria for metabolic syndrome speaks to the challenge of effectively

identifying and managing metabolic syndrome in obese persons in traditional general internal medicine settings.

Our findings also highlight possible associations between dieting and metabolic syndrome that are somewhat consistent with a previous study.[22] Obese BED patients *without* metabolic syndrome had longer, more significant dieting histories and reported higher levels of current eating restraint than obese BED patients with metabolic syndrome, despite no group differences in BMI. Unlike the sample of Roehrig and colleagues,[22] there were no differences in BMI or weight cycling; however, both studies indicate that time spent dieting may buffer the development of metabolic syndrome. These findings certainly must be interpreted with caution and should be replicated within other obese BED samples, both from specialty clinics and primary care centers.

These findings also suggest that there is a need for greater clinical and research attention in primary care settings to be devoted to obese persons who binge eat. As obesity is associated with numerous medical comorbidities, obese individuals are more likely to use health care clinic services. Primary care providers are typically the first point of contact with the health care system for an individual and are therefore in a unique position to recommend appropriate treatment and referral for a range of physical and psychiatric disorders.

Despite a strong association between BED and increased health care service utilization and health and psychosocial problems, BED frequently is not noted by primary care providers.[25] This may reflect several factors, including limited familiarity with BED, time constraints, lack of insurance reimbursement for lifestyle counseling, or simply greater attention devoted to treating obesity-related comorbidities (eg, diabetes) rather than to obesity itself. Surveys of faculty and residents in general internal medicine have revealed that many physicians feel that they have inadequate competencies for treating obesity and report that they feel unable to adequately counsel patients about treatment options.[40,41] We believe that it is important that primary care providers have open discussions with their obese patients regarding their excess weight and eating patterns and to indicate that there are specific pharmacologic[41] and behavioral[42] treatments with demonstrated effectiveness for BED.

We note several strengths and limitations of our study as context for interpreting the findings. Strengths include the consecutive sampling of obese patients with BED who were seeking treatment for obesity and binge eating in primary care in a department of general internal medicine in an academic setting. The study group was rigorously assessed by doctoral-level research clinicians using state-of-the-art diagnostic measures, and metabolic syndrome was determined using measured and laboratory values. The patient group was ethnically diverse, consisted of both genders, and appears generalizable to both primary care facilities in an urban setting and reflective of the distribution of BED in the general population.[23]

Potential limitations include possible sampling biases. Our consecutive series of obese patients with BED were treatment seekers (ie, respondents to recruitment ads) and do not represent a consecutive series of primary care patients. Thus, our findings may not generalize to obese patients with BED in primary care settings who did not wish to participate in research studies or to seek treatment for their weight or binge-eating concerns. Furthermore, our findings may not generalize to obese patients in primary care who have cardiac or neurologic problems or to those who are currently taking psychoactive medications, such as SSRI antidepressants, since these represented exclusionary criteria for our study. It is also uncertain whether the findings generalize to similar patients who choose to seek treatment in difference clinical settings (eg, obesity or eating disorder programs). Further studies are needed to examine the distribution and nature of both BED and metabolic syndrome in obese patients in primary care settings who do not seek treatment for their weight/eating concerns. Lastly, our cross-sectional design precludes any statements regarding causality or directionality, and longitudinal studies are needed to track the outcomes of patients with these coexisting problems.

In summary, in a consecutive series of obese patients with BED who were interested in participating in a treatment study being performed in primary care, we found that 43% met criteria for metabolic syndrome. Men had significantly higher rates of metabolic syndrome than women, but there were no significant associations with ethnicity or BMI. Frequency of binge-eating episodes and eating disorder psychopathology did not differ significantly between those with versus without metabolic syndrome. However, the absence of metabolic syndrome was associated significantly with greater time spent dieting and with indicators of current dieting.

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