Prevalence of Metabolic Syndrome in Hispanic and Non-Hispanic Patients With Schizophrenia

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Background: Metabolic syndrome, a constellation of truncal obesity, dyslipidemia, disturbed insulin and glucose metabolism, and hypertension, is associated with the development of diabetes mellitus and coronary heart disease. However, the prevalence of metabolic syndrome in Hispanic patients with schizophrenia and whether they differ from comparable non-Hispanic patients is uncertain.

Method: This cross-sectional study, conducted from January 2002 to May 2002, included 48 patients with schizophrenia who were recruited from an outpatient psychiatric clinic. Metabolic syndrome was defined using the criteria of the Third Report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults.

Results: The prevalence of metabolic syndrome was 63% in all patients with schizophrenia. The metabolic syndrome was present in 41% of non-Hispanic patients and in 74% of Hispanic patients with schizophrenia. Metabolic syndrome was present in 70% of Cuban Americans and 88% of other Hispanic subgroups with schizophrenia. Metabolic syndrome was associated with waist circumference ($p < .05$) and high-density lipoprotein cholesterol ($p < .05$) in logistic regression analysis.

Conclusions: These data suggest that schizophrenic patients have a 3-fold greater risk to develop metabolic syndrome than the general population. Hispanic schizophrenic patients have a significantly greater prevalence of metabolic syndrome than non-Hispanic schizophrenic patients ($p < .05$). An increased waist circumference is the strongest clinical correlate with metabolic syndrome in schizophrenic patients.

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Patients with schizophrenia, a severe and chronic mental disorder, often fail to receive adequate medical care. The prevalence of diabetes mellitus is 2 to 4 times greater among schizophrenic patients than in the general population.[1–3] Metabolic syndrome, a constellation of lipid and non-lipid risk factors, is associated with the development of coronary heart disease and diabetes mellitus.[4,5] Insulin resistance is thought to be the underlying pathophysiology of metabolic syndrome.[6] The Third Report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III) highlights the importance of treating patients with metabolic syndrome to prevent coronary heart disease.[4]

The prevalence of metabolic syndrome in schizophrenic patients has been reported as 37% in a subpopulation of European patients.[7] The prevalence of metabolic syndrome is approximately 22% in U.S. adults and 32% in Mexican Americans.[8] Prevalence studies of metabolic syndrome in other Hispanic subgroups have not been reported to our knowledge. This study is the first to address the prevalence of metabolic syndrome in Cuban Americans. Despite their common language, Hispanic subgroups differ. Thus, findings in Mexican Americans, who tend to have a substantial Native American admixture, may not be relevant to Cuban Americans, who characteristically have no Native American admixture. The population in South Florida includes several Hispanic subgroups. This population provides an opportunity to examine whether there are differences in the prevalence of metabolic syndrome between Hispanics and non-

Hispanics and to determine whether any differences are consistent for Hispanic subgroups. We thus compared the prevalence of metabolic syndrome among Cuban Americans, other Hispanics residing in South Florida, and non-Hispanics.

Our hypothesis is that patients with schizophrenia have a higher incidence of metabolic syndrome than the general population, explaining the higher incidence of diabetes mellitus in this population. On the basis of prior studies, we further hypothesize that Hispanic schizophrenic patients will have an even higher prevalence of this syndrome than non-Hispanic schizophrenic patients.[8,9] Data supporting this hypothesis may provide a new approach to early primary prevention and the improvement of medical care for this underserved population.

This pilot cross-sectional study was conducted to assess the prevalence of metabolic syndrome in schizophrenic patients and any demographic, clinical, and laboratory variables significantly associated with this syndrome.

METHOD

A convenience sampling method was utilized for this study. Patients with schizophrenia were recruited from an outpatient psychiatric clinic. All subjects, aged 18 to 65 years, met DSM-IV criteria for schizophrenia. Patients were required to be on a stable dose of only 1 antipsychotic medication for at least 3 months prior to entering the study. These patients had no history of chronic medical illnesses and were taking no medications known to affect glucose or lipids. Other exclusion criteria included patients who were pregnant, suicidal, active substance abusers, and those who in the investigators' opinion lacked capacity to give consent. This study was approved by the Subcommittee for the Protection of Human Subjects at the University of Miami. Informed consent was obtained from each subject. This study was conducted from January 2002 to May 2002.

Participants were seen after a 12-hour fast. All historical information was obtained by interview and from the patients' charts. Sitting blood pressure was measured twice, and the mean reading was used. Waist circumference (WC) taken at the level of the umbilicus was measured twice, and the mean measurement was used. Fasting blood glucose levels and lipid profiles were obtained.

The metabolic syndrome was defined as ≥ 3 of the following abnormalities described by the ATP III: WC greater than 102 cm in men and 88 cm in women, serum triglyceride level ≥ 150 mg/dL, high-density lipoprotein (HDL) cholesterol < 40 mg/dL in men and < 50 mg/dL in women, blood pressure ≥ 130/85 mm Hg, or fasting serum glucose level ≥ 110 mg/dL.[4]

Height and weight were also measured to calculate body mass index (BMI), which is weight in kilograms divided by the square of height in meters. BMI is the accepted measure to assess obesity.[10] Obesity is defined by a BMI value ≥ 30 kg/m^2. Obesity has been associated with the development of metabolic syndrome.[11]

All data were analyzed using the Statistical Program for Social Sciences 10.0 software program (SPSS, Inc., Chicago, Ill.). Student t test and the χ^2 test for association were used to compare groups. The Fisher exact test was used if the expected cell size was < 5. Logistic regression analysis was utilized to allow for covariates. The p values were 2-sided, and the term statistically significant implies a p value < .05.

Table 1. Demographics and Characteristics of Schizophrenic Patients[a]

Variable	Patients With Metabolic Syndrome (N = 30)	Patients Without Metabolic Syndrome (N = 18)	p Value
Age, y	41.60 ± 11.86	38.11 ± 12.27	.341
BMI, kg/m^2	34.16 ± 5.93	30.25 ± 6.46	.044
Sex			
Male	13 (43)	11 (61)	
Female	17 (57)	7 (39)	.233
Smoking			
Yes	9 (30)	5 (28)	
No	21 (70)	13 (72)	.870
Family history of DM or CHD			
Yes	9 (30)	5 (28)	
No	9 (30)	5 (28)	
Unknown	12 (40)	8 (44)	1.00
Race			
White	27 (90)	16 (89)	
Black	3 (10)	2 (11)	.420
Ethnic group			
Hispanic	23 (77)	8 (44)	
Non-Hispanic	7 (23)	10 (56)	.024

[a]Data shown as mean ± SD and N (%).
Abbreviations: BMI = body mass index, CHD = coronary heart disease, DM = diabetes mellitus.

RESULTS

Forty-eight schizophrenic patients enrolled in the study. The sample consisted of 24 women and 24 men, with a mean ± SD age of 40.29 ± 12.01 years. The ethnic background of the group included 31 Hispanics (23 Cuban Americans, 8 other Hispanics) and 17 non-Hispanics. The prevalence of metabolic syndrome was 63% (30/48) in all patients with schizophrenia. The demographics and characteristics of the study participants with and without metabolic syndrome are shown in Table 1. Patients with metabolic syndrome had a significantly higher BMI than those without metabolic syndrome. Hispanic patients had a significantly greater prevalence of metabolic syndrome than non-Hispanics.

The values for each of the components of metabolic syndrome are shown in Table 2. There was a significant difference between groups in all components of metabolic

Table 2. Components of Metabolic Syndrome Among Schizophrenic Patients[a]

Variable	Patients With Metabolic Syndrome (N = 30)	Patients Without Metabolic Syndrome (N = 18)	p Value
Blood pressure (mm Hg)			
Systolic	130.75 ± 16.82	114.33 ± 11.97	< .001
Diastolic	84.53 ± 9.69	74.42 ± 5.19	< .001
Triglycerides (mg/dL)	256.28 ± 148.90	147.56 ± 68.93	.001
HDL cholesterol (mg/dL)	41.26 ± 9.45	48.02 ± 11.79	.046
Fasting glucose (mg/dL)	120.70 ± 92.90	90.72 ± 9.78	.090
Waist circumference (cm)	109.94 ± 8.31	93.59 ± 12.92	< .001

[a]Data shown as mean ± SD.
Abbreviation: HDL = high-density lipoprotein.

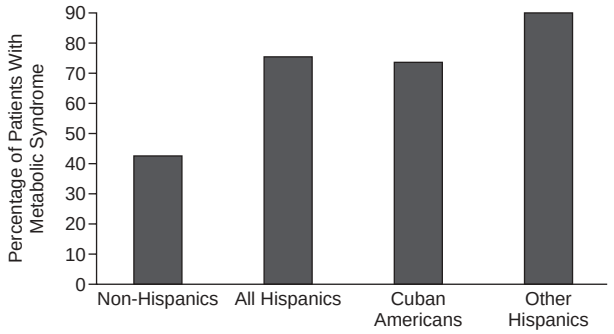
Table 3. Characteristics of Treatment With Antipsychotic Medication

Variable	Patients With Metabolic Syndrome (N = 30)	Patients Without Metabolic Syndrome (N = 18)	p Value
Antipsychotics, N (%)			
Atypicals	25 (83)	13 (72)	.468
Conventionals	5 (17)	5 (28)	
Antipsychotics, N (%)			
Clozapine	17 (57)	7 (39)	.671
Haloperidol	5 (17)	5 (28)	
Olanzapine	4 (13)	3 (17)	
Risperidone	4 (13)	3 (17)	
Antipsychotic dose, mg/d, mean (SD)			
Clozapine	308.82 (142.23)	367.86 (180.69)	.402
Haloperidol	9.40 (6.84)	16.00 (5.48)	.131
Olanzapine	14.38 (8.26)	25.00 (8.66)	.160
Risperidone	6.75 (0.96)	6.00 (0)	.243
Duration of antipsychotic treatment, y, mean (SD)			
Clozapine	6.06 (3.95)	6.29 (3.95)	.881
Haloperidol	5.60 (0.89)	4.80 (1.79)	.397
Olanzapine	3.50 (1.29)	4.00 (1.73)	.677
Risperidone	3.50 (1.29)	4.33 (0.58)	.352

syndrome except for fasting serum glucose level. In patients with metabolic syndrome, 90% had abnormal WC, 83% had increased triglyceride levels, 77% had abnormal HDL cholesterol, 73% had hypertension, and 30% had abnormal fasting glucose levels. In logistic regression analysis, the only association with metabolic syndrome that remained statistically significant after controlling for age, gender, race, and ethnicity was WC ($\beta \pm SE = 0.164 \pm 0.06$, 95% CI = 1.047 to 1.326, $p < .05$) and HDL cholesterol ($\beta \pm SE = -0.149 \pm 0.07$, 95% CI = 0.751 to 0.989, $p < .05$).

No association was found between metabolic syndrome and antipsychotic medications in our data (Table 3). Subjects were categorized first into conventional or atypical antipsychotic groups, and then the atypical group was further subdivided by each individual medication. Logistic regression analysis was used to compare the prevalence of metabolic syndrome in subjects taking atypical antipsychotic with those taking conventional antipsychotic medications, and the odds ratio (OR) was not significant (OR = 0.520, 95% CI = 0.127 to 2.128, $p = .606$).

Figure 1. Prevalence of the Metabolic Syndrome by Ethnic Groups in Schizophrenic Patients



Hispanics had a significantly higher prevalence of metabolic syndrome at 74% than non-Hispanics at 41% ($p < .05$) (Figure 1). Among the Hispanics, 23 (74%) were of Cuban origin, 4 (13%) were South American, 3 (10%) were Central American, and 1 (3%) was Puerto Rican.

For purposes of analysis, the Hispanic group was subdivided into Cuban American and other Hispanic schizophrenic patients, and each was compared with non-Hispanic schizophrenic patients. The prevalence of metabolic syndrome was 70% in Cuban Americans, 88% in other Hispanics, and 41% in non-Hispanics (Figure 1). Although there were no significant differences between Cuban American and other Hispanic schizophrenic patients, there was a significantly higher prevalence of metabolic syndrome in other Hispanic schizophrenics when compared with non-Hispanic schizophrenics ($p < .05$). No significant differences were found between Cuban American and non-Hispanic schizophrenic patients.

DISCUSSION

In this pilot study, the prevalence of metabolic syndrome in patients with schizophrenia was 63%, which is far greater than the 22% prevalence in the general population. Hispanic patients with schizophrenia had a higher prevalence of metabolic syndrome at 74% than did the non-Hispanics at 41%. Our findings in non-Hispanics are comparable with those reported in European schizophrenic patients.[7] When Cuban American and other Hispanic schizophrenic patients were compared with non-Hispanic schizophrenic patients, only a significant difference in the prevalence of metabolic syndrome was found between other Hispanic and non-Hispanic schizophrenics. We suspect no differences were found between Cuban American and non-Hispanic schizophrenic patients due to the small sample size.

As metabolic syndrome is a precursor for the development of coronary heart disease and diabetes mellitus, early recognition and treatment of metabolic syndrome may prevent these diseases. The data presented in this article show that the most common finding in these patients was an abnormal WC followed by dyslipidemia and hypertension. Elevated fasting blood glucose was the least frequent abnormality. Notably, abnormal WC and low HDL cholesterol were the 2 measures that significantly correlated with this syndrome. Therefore, WC and lipid profile may be the best measures to assess for metabolic syndrome in this population, thereby providing the clinician measures for early recognition, appropriate treatment, and possible prevention of diabetes mellitus and coronary heart disease.

We propose the measurement of WC as a screening tool for metabolic syndrome in this population. Waist circumference measurement can provide an opportunity for primary prevention of coronary heart disease and diabetes mellitus in patients with schizophrenia. This screening tool is an objective measure that is easily obtained in any health care setting. Patients with increased WC should be encouraged to lose weight and increase their physical activity.

In logistic analysis, no statistically significant association was found between metabolic syndrome and BMI. Rather, the association lies in the distribution of fat, or central obesity as indicated by the WC. This finding points to a relationship between metabolic syndrome and central obesity. Even though there is general public acceptance of measuring weight and height, we need to develop a more effective screening tool through the utilization of WC measurement to diagnose metabolic syndrome.

As dyslipidemia and hypertension were common abnormalities, we propose monitoring fasting lipid profile and blood pressure annually in patients with schizophrenia. Even though elevated blood glucose was the least common finding, we propose checking fasting blood glucose levels annually as well.

Antipsychotic medications, in particular atypical antipsychotics, have been associated with weight gain, dyslipidemia, and diabetes mellitus.[1,2] No statistically significant association between metabolic syndrome and antipsychotic medications was found in this study. Our findings are consistent with those reported in European schizophrenic patients.[7] However, a limitation in our study is that half of the patients were taking clozapine. Other limitations include lack of a control group and the small sample size. The power to identify relationships between ethnicity and metabolic syndrome is reduced due to the small sample size.

Psychiatrists and primary care physicians need to work together in recognizing the high risk among schizophrenic patients to develop metabolic syndrome and therefore prevent and institute early effective treatment. Further studies are needed to corroborate our findings, in order to provide patients with schizophrenia a higher standard of medical care.

Drug names: clozapine (Clozaril and others), haloperidol (Haldol and others), olanzapine (Zyprexa), risperidone (Risperdal).

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