

The prevalence of metabolic syndrome among psychiatric inpatients in Brazil

Prevalência de síndrome metabólica em pacientes psiquiátricos internados no Brasil

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Abstract

Objective: Metabolic syndrome is a highly prevalent disorder among the general population. Studies show an even higher prevalence among psychiatric patients. The objective of this study is to assess the prevalence of metabolic syndrome among inpatients of a psychiatric ward of a general hospital in Brazil and correlate it with their respective psychiatric diagnoses and with the antipsychotics and mood stabilizers used. **Method:** 170 inpatients (mean age: 45.6 years) were evaluated according to the National Cholesterol Education Program criteria for metabolic syndrome, with a modification of the criteria for blood pressure and fasting glucose. **Results:** The prevalence found was 29.4%, being higher in women (43.6% versus 20.8%, $p = 0.002$). The prevalence stratified by psychiatric diagnostic was 48.1% for depression, 38.3% for bipolar disorder, 31.8% for schizophrenia and schizoaffective disorder, 5.1% for alcoholism, and 23.1% for "other mental disorders". The prevalence for alcoholism was significantly lower than the prevalence rates associated with other diagnostic categories ($p = 0.035$). After using the multivariate analysis, female gender and use of lithium remained as factors associated with a diagnosis of metabolic syndrome. **Conclusions:** The prevalence found was 29.4%. Gender (female) and use of lithium were factors significantly associated with the diagnosis of metabolic syndrome.

Descriptors: Metabolic syndrome X; Mental disorders; Schizophrenia; Bipolar disorder; Depression

Resumo

Objetivo: A síndrome metabólica é um transtorno de alta prevalência na população em geral. Estudos demonstram prevalência ainda maior em pacientes psiquiátricos. O objetivo deste trabalho é avaliar a prevalência de síndrome metabólica em pacientes internados em uma enfermaria psiquiátrica de um hospital geral no Brasil e correlacioná-la com os diagnósticos psiquiátricos e com o uso de medicamentos antipsicóticos e moduladores do humor. **Método:** Cento e setenta pacientes (idade média: 45,6 anos) foram avaliados de acordo com os critérios do National Cholesterol Education Program para síndrome metabólica, modificados nos critérios pressão arterial e glicemia de jejum. **Resultados:** A prevalência encontrada foi de 29,4%, sendo mais elevada em mulheres (43,6% versus 20,8%, $p = 0,002$). A prevalência estratificada por diagnóstico psiquiátrico foi de 48,1% para depressão, 38,3% para transtorno bipolar, 31,8% para esquizofrenia e transtornos esquizoafetivos, 5,1% para alcoolismo e 23,1% para "outros transtornos mentais". A prevalência para alcoolismo foi significativamente menor, se comparada às prevalências associadas às demais categorias diagnósticas ($p = 0,035$). Após análise multivariada, o sexo feminino e o uso de lítio permaneceram como fatores associados ao diagnóstico de síndrome metabólica. **Conclusão:** A prevalência de síndrome metabólica encontrada foi de 29,4%. O sexo feminino e o uso de lítio foram fatores significativamente associados ao diagnóstico de síndrome metabólica.

Descritores: Síndrome X metabólica; Transtornos mentais; Esquizofrenia; Transtorno bipolar; Depressão

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Introduction

Metabolic syndrome (MS) is a complex disorder composed by a set of cardiovascular risk factors that are usually related to central depositing of fat and to insulin resistance.¹ Its principal components are: abdominal obesity, alterations in glucose homeostasis, such as hyperglycemia or diabetes mellitus (DM) type 2, elevation of blood pressure and dyslipidemia. A proinflammatory and prothrombotic state may also be present.²

Three diagnostic criteria have been suggested for MS. The first criterion, proposed by the World Health Organization (WHO), considered insulin resistance as a necessary factor for diagnosis.³ A second criterion, with greater clinical applicability, was elaborated by the National Cholesterol Education Program - Adult Treatment Panel III (NCEP).⁴ More recently, the International Diabetes Federation (IDF) proposed a definition of the syndrome, where the presence of visceral fat became the main diagnostic factor.⁵

MS is a disturbance of high prevalence in the general population. According to data from the *Third National Health and Nutrition Examination Survey* (NHANES III), performed between 1988 and 1994, the age-adjusted prevalence for the adult American population is 23.7%.⁶ Data from *Kuopio Ischaemic Heart Disease Factor Study* indicated a prevalence index in the male population of Finland and Sweden between 8.8% and 14.3%, depending on the diagnostic criteria used.⁷

The prevalence of MS is even higher in psychiatric populations. In various countries, studies with patients who have schizophrenia or schizoaffective disorder found indexes that varied between 28.4% and 62.4%.⁸⁻¹⁵ Saari et al. found a lower index (19.4%) for individuals with schizophrenia, who belong to the *Northern Finland 1966 Birth Cohort*. This was, however, 3.7 times higher than the control group.¹⁶ In the United States, Fagiolini et al. found a prevalence of 30% in patients with bipolar disorder.¹⁷

The use of psychotropic medication stands out as one of the main causes of the higher prevalence of MS in psychiatric patients. Weight gain is a frequent side effect of many antipsychotics, mood stabilizers and antidepressants.^{18,19} Furthermore, many antipsychotics also have adverse effects on the glycidic and lipid metabolisms.^{18,20-22}

Thus, the objective of this study is to assess the prevalence of metabolic syndrome in a sample composed by inpatients from the psychiatric clinic of a general hospital in Brazil, and correlate it with the psychiatric diagnoses of the patients and with the antipsychotics and mood stabilizers used.

Method

This study was performed during the period from December of 2004 and June of 2005, at the psychiatric clinic of the

Hospital Governador Israel Pinheiro (HGIP), in Belo Horizonte, MG, Brazil. The HGIP provides family care to the working and retired public servants, and their pensioners, of the State of Minas Gerais. All of the psychiatric inpatients admitted in December, 2004, were invited to participate until the number of 170 patients was reached. The only exclusion criteria used was the presence of pregnancy or a history of pregnancy in the last six months.

The NCEP criteria for MS diagnosis was used,⁴ and three or more of the following conditions were necessary: 1) waist circumference > 102 cm for males and > 88 cm for females; 2) tryglicerides \geq 150 mg/dl; 3) HDL levels < 40 mg/dl for males and < 50 mg/dl for females; 4) blood pressure \geq 130/85 mmHg; 5) fasting glucose \geq 110 mg/dl. A previous diagnosis of high blood pressure was considered sufficient to fulfill the criterion (4) and a previous diagnosis of diabetes mellitus was considered as sufficient to fulfill the criterion (5). These situations were not considered in the criteria proposed by the NCEP, but the conduct described is recommended by IDF.⁵

The participants were evaluated by a standardized interview. The information supplied by the patients was complemented and confirmed by charts review and, if necessary, by contacting their physicians. The sociodemographic data evaluated were: gender, age, marital status, number of years of schooling, present work status. Information about the psychiatric diagnosis, duration of illness, and the psychotropic medication in use at the time of the interview was collected.

The psychiatric diagnosis considered for each patient was the primary diagnosis, confirmed by their assisting physician, according to *The ICD 10 Classification of Mental and Behavioral Disorders*.²³ The psychiatric diagnoses were grouped into five categories: 1) schizophrenia and schizoaffective disorder (F20 and F25); 2) bipolar disorder (F31); 3) depression (major depressive episode or recurring depressive disorder, F32 and F33); 4) alcoholism (mental and behavioral disorders due to the use of alcohol, F10); and 5) other mental disorders (including dementia, mental retardation, personality disorders, and mental disorders due to psychoactive substance use other than alcohol).

The antipsychotics considered in the assessment were clozapine, olanzapine, risperidone, haloperidol (oral and depot routes), chlorpromazine, levomepromazine and thioridazine, these last three being grouped in a category denominated "phenothiazines". Mood stabilizers considered were lithium carbonate, valproic acid and carbamazepine. For this specific analysis, a given patient could be considered to be using one of the above medications if the period of current use was at least 30 days or if the medication was in current use for less

Table 1 - Distribution of psychiatric diagnoses in the sample stratified by gender, with values of mean age and duration of illness

Gender and diagnostic category (CID 10)		Age (years)		duration of illness > 10 years
		n (%)	mean (sd)	n (%)
Females	Schizophrenia and schizoaffective disorder (F20 and F25)	10 (15.6%)	48.2 (12.0)	6 (60.0)
	Bipolar affective disorder (F31)	35 (54.7%)	45.4 (11.5)	22 (62.9%)
	Depression (F32 and F33)	17 (26.6%)	49.9 (11.0)	8 (47.1%)
	Alcoholism (F10)	0 (0.0%)	-	-
	Other mental disorders	2 (3.1%)	38.0 (11.3)	1 (50.0%)
	Total	64 (100%)	46.8 (11.4)	37 (57.8%)
Males	Schizophrenia and schizoaffective disorder (F20 and F25)	34 (32.1%)	40.4 (12.4)	23 (67.6%)
	Bipolar affective disorder (F31)	12 (11.3%)	49.5 (17.5)	10 (83.3%)
	Depression (F32 and F33)	10 (9.4%)	47.5 (10.1)	4 (40.0%)
	Alcoholism (F10)	39 (36.8%)	49.7 (8.7)	26 (66.7%)
	Other mental disorders	11 (10.4%)	34.7 (10.1)	8 (72.7%)
	Total	106 (100%)	44.9 (12.5)	71 (67.0%)

Table 2 - Prevalence of MS classified by psychiatric diagnosis and gender

Diagnostic category (CID 10)	Females		Males		Total	
	n	%	n	%	n	%
Schizophrenia and schizoaffective disorder (F20 and F25)	4	40.0	10	29.4	14	31.8
Bipolar affective disorder (F31)	15	42.9	3	25.0	18	38.3
Depression (F32 and F33)	9	52.9	4	40.0	13	48.1
Alcoholism(F10)	0	0	2	5.1	2	5.1
Other mental disorders	0	0	3	27.3	3	23.1
Total	28	43.8	22	20.8	50	29.4

Table 3 - Prevalence of MS classified according to use of antipsychotics and mood stabilizers¹

Drug	Prevalence de MS (n/n)
Clozapine	28.6% (2/7)
Olanzapine	36.4% (4/11)
Risperidone	8.3% (1/12)
Haloperidol	47.8% (11/23)
Phenothiazines ²	27.3% (6/22)
Lithium	54.2% (13/24)
Valproic acid	40.0% (10/25)
Carbamazepine	41.7% (5/12)

¹ Considering only patients with present use of those drugs for at least 30 days or if the medication was in current use for less than 30 days in addition to having a history of past use for at least 30 days

² Phenothiazines: include chlorpromazine, levomepromazine and thioridazine

than 30 days in addition to having a history of its use in the past for at least 30 days. The same patient could be included more than once in this analysis if the above criteria had been met for two or more drugs in study.

The patients underwent an exam where their abdominal circumference and blood pressure were measured. The measurement of the abdominal circumference was taken at the midpoint between the iliac crest and the lower rib.²⁴ Blood pressure was measured with the patient seated and resting. Blood pressure was measured twice, with a minimum interval of one minute, calculating the average values of the systolic and diastolic pressures obtained.²⁵ When treating patients with a diagnosis of alcohol dependence syndrome, blood pressure, if high, was repeated on the fifth day of hospitalization and those were the values that were considered.

Fasting blood samples were collected to assess glucose, triglycerides and HDL levels. Glucose was measured by the oxidative glucose colorimetric method, with dry chemistry readings with reflectometry. The triglycerides were measured by the enzymatic and colorimetric method. HDL was measured by homogenic or direct method.

The calculation of the sample size came from the population formed by the inpatients of the psychiatric clinic of the HGIP, considering the number of 600 hospitalizations/year. According to the sample proportional calculation, taking the prevalence of 20% found in a pilot study into account, and considering an error of 5% and a confidence of 95%, the sample size reached 164 patients, slightly less than the real sample size of 170 patients.

The statistical analysis consisted initially of descriptive measures for the variables under study. For this purpose, frequencies and percentages were used for category variables and means, medians and standard deviations were used for quantitative variables. The chi-square test was used to evaluate the difference in prevalence between the genders. Comparison of diagnoses was performed using ANOVA (F test) and, in the case of a significant difference, the Tukey Test was applied. The logistical regression model was used to identify the most important factors for the dichotomic response: the presence or absence of MS. In all the statistical tests used, differences were considered to be significant when p was less than 0.05. The analyses were performed with the software SPSS 12.0 Inc (Statistical Package for Social Sciences).

This study was approved by the Ethical Committee for Research at the HGIP (n^o 140/04), and having been carried out according to the internationally recognized ethical precepts. Informed consent was obtained from each patient; those who were considered incapable of consenting only participated with the consent of their closest family member or custodian.

Results

Of all the inpatients in the psychiatric clinic of the HGIP during the study period, 93% agreed to participate. Of these ($n = 170$), 37.6% were female and 62.4% were male. The mean age was 46.8 (SD = 11.4) years for women and 44.9 (SD = 12.5) for men. The most commonly found diagnostic category was bipolar disorder (27.6%). Among the women, this category accounted for more than half of the diagnoses (54.7%). No woman had alcoholism as her primary diagnosis. The most frequent diagnosis among men was alcoholism (36.8%), followed by the category of schizophrenia and schizoaffective disorder (32.1%). A duration of illness greater than 10 years was presented by 57.8% of the women and 67.0% of the men. The distribution of the diagnoses, with their respective mean ages is found in Table 1.

Considering the determined criteria for the analysis (a minimum period of use, present or past, of at least 30 days), 25 (14.7%) patients were using valproic acid, 24 (14.1%) were using lithium, 23 (13.5%) were using haloperidol; 22 (12.9%) were using phenothiazines (include chlorpromazine, levomepromazine or thioridazine), 12 (7.1%) were using risperidone, 12 (7.1%) were using carbamazepine, 11 (6.5%) were using olanzapine, and 7 (4.1%) were using clozapine.

The prevalence of MS in the sample studied was 29.4% ($n = 50$; 95% CI: 22.7-36.9). The prevalence found for females was 43.8% ($n = 28$; 95% CI: 31.4-56.7), while the prevalence among males was 20.8% ($n = 22$; 95% CI: 13.5-29.7); the difference between the genders was significant ($p = 0.002$). The prevalence of MS stratified by diagnoses was 48.1% ($n = 13$) for depression, 38.3% ($n = 18$) for bipolar disorder, 31.8% ($n = 14$) for schizophrenia and schizoaffective disorder, 5.1% ($n = 2$) for alcoholism, and 23.1% ($n = 3$) for "other mental disorders". The prevalence in alcoholics was significantly lower than the prevalence rates associated with other diagnostic categories ($p = 0.035$). The prevalence of MS classified according to psychiatric diagnosis and gender is found in Table 2.

The prevalence for MS classified by medication is found in Table 3. The prevalence is the highest in the group of patients taking lithium (54.2%) and the lowest in the group of patients taking risperidone (8.3%). The prevalence of MS in patients using lithium was higher when compared to patients that were not using this medication ($p = 0.014$). Three of the 24 patients using lithium presented glycemic values compatible with DM, and two of these had already gotten this diagnosis.

Table 4 - Descriptive analysis of each criterion for the diagnosis of MS stratified by psychiatric diagnosis and gender

Variable/diagnosis	Females		Males	
	Mean (SD)	Median	Mean (SD)	Median
Abdominal circumf. (cm)	93.4 (14.0)	93.5	92.9 (14.0)	90.0
Schizophr. and schizoaff. disorder	93.4 (11.9)	93.0	93.2 (13.4)	95.0
Bipolar affective disorder	93.8 (16.2)	95.0	93.6 (13.1)	92.0
Depression	95.5 (11.3)	95.0	101.6 (20.2)	98.5
Alcoholism	-	-	88.5 (9.7)	87.0
Other mental disorders	82.0 (0.0)	82.0	90.3 (10.9)	88.0
Triglycerides (mg/dl)	189.1 (120.8)	160.5	181.2 (141.6)	145.5
Schizophr. and schizoaff. disorder	156.2 (54.3)	155.0	162.8 (41.3)	154.0
Bipolar affective disorder	181.5 (133.1)	154.0	121.4 (57.9)	106.0
Depression	212.9 (117.0)	165.0	248.5 (112.3)	224.5
Alcoholism	-	-	145.3 (93.5)	112.0
Other mental disorders	142.5 (47.4)	142.5	196.1 (124.6)	174.0
Serum HDL (mg/dl)	44.1 (12.0)	41.5	45.6 (18.9)	40.0
Schizophr. and schizoaff. disorder	38.0 (10.6)	38.0	35.8 (9.9)	36.0
Bipolar affective disorder	45.4 (10.1)	42.0	37.4 (13.3)	32.0
Depression	42.5 (12.2)	47.0	43.5 (18.5)	39.5
Alcoholism	-	-	58.9 (20.4)	55.0
Other mental disorders	40.0 (1.4)	40.0	38.0 (14.6)	41.0
Blood pressure (mmHg)				
Systolic	112.6 (17.6)	110.0	116.4 (13.1)	116.5
Schizophr. and schizoaff. disorder	112.2 (11.0)	110.0	112.2 (7.2)	111.0
Bipolar affective disorder	115.6 (20.8)	110.0	117.3 (16.8)	115.0
Depression	109.0 (13.7)	106.0	114.8 (15.8)	112.0
Alcoholism	-	-	119.0 (14.0)	120.0
Other mental disorders	100.0 (2.8)	100.0	115.2 (9.5)	116.0
Diastolic	71.9 (10.3)	70.0	77.0 (9.7)	78.0
Schizophr. and schizoaff. disorder	74.6 (9.3)	78.0	76.0 (7.1)	73.0
Bipolar affective disorder	73.0 (11.2)	70.0	73.9 (10.4)	76.0
Depression	69.4 (9.1)	70.0	79.8 (10.2)	81.0
Alcoholism	-	-	77.7 (9.6)	78.0
Other mental disorders	59.0 (1.4)	59.0	76.8 (9.8)	72.0
Fasting glucose (mg/dl)	82.2 (26.7)	82.0	88.4 (38.8)	80.0
Schizophr. and schizoaff. disorder	78.2 (7.9)	75.0	90.5 (19.0)	80.5
Bipolar affective disorder	86.7 (27.8)	83.0	88.7 (11.4)	87.0
Depression	91.1 (31.5)	82.0	105.3 (49.1)	86.5
Alcoholism	-	-	86.3 (44.0)	77.0
Other mental disorders	82.0 (7.0)	82.0	93.5 (72.2)	72.0

A descriptive analysis was done for each of the components of MS, classified by psychiatric diagnosis and gender (Table 4). The means and medians of the HDL values were inferior to the cutoff point (< 50 mg/dl) for females, in all the diagnostic categories. For males, these values were inferior to the cutoff point (< 40 mg/dl) when associated with schizophrenia and schizoaffective disorder, bipolar disorder and the category of "other mental disorders"; the median was also inferior to this value in patients with depression. Male alcoholics presented a median and a mean value above 55.0 mg/dl. Measurement of abdominal circumference was shown to be elevated (> 88 cm) for females, both for the median and the mean, in all of the diagnostic categories, with exception of the category "other mental disorders". Similar or slightly higher values were found for males, although the medians and the means were inferior to the cutoff point for this gender (< 102 cm). Triglyceride levels for females were elevated (> 150 mg/dl), both for the mean and median, in all the diagnostic categories except for "other mental disorders". For males, the mean and median of triglycerides levels were found to be lower than the cutoff point for patients with bipolar disorder and alcoholism. The means and medians for the other components of MS - blood pressure and fasting glucose - were within the limits considered normal for patients of both genders in all the diagnostic categories.

A descriptive analysis was also done for each of the components of MS stratified by antipsychotics and mood

stabilizers considered in this study (Table 5). The medians and means for blood pressure and fasting glucose were also found within the normal limits in all categories. As for the measurements of abdominal circumference, risperidone presented values lower than the mean (87.5 cm) and the median (87.0 cm); the others presented values between 90 and 101 cm. Triglyceride levels were elevated in all the mean values; in patients using clozapine this value reached 272.0 mg/dl. Only the patients using risperidone or haloperidol presented medians within the normal limits (119.0 mg/dl and 149.0 mg/dl, respectively). The mean values of HDL oscillated between 36.6 mg/dl (valproic acid) and 47.6 mg/dl (olanzapine). The median values for HDL oscillated between 34.0 mg/dl (haloperidol) and 49.0 mg/dl (olanzapine).

Finally, a multivariate analysis was performed, considering gender, age, occupation, main diagnosis, period of evolution of mental disorder and medication. After application of the logistical regression model, the following factors were significantly associated with the occurrence of MS: female gender ($p = 0.008$ - odds ratio = 2.60) and the use of lithium ($p = 0.029$ - odds ratio = 2.79).

Discussion

To our knowledge, this is the first study in Brazil to specifically assess the prevalence of MS in patients with mental disorders. However, one previous study, which assessed some metabolic

Table 5 - Descriptive analysis of each criterion for the diagnosis of MS stratified by use of antipsychotics and mood stabilizers¹

	Abdominal circumfer. (cm)	Triglycerides (mg/dl)	HDL (mg/dl)	Systolic pressure (mmHg)	Diastolic pressure (mmHg)	Fasting glucose (mg/dl)
Clozapine						
Median	90.0	193.0	36.0	110.0	78.0	85.0
Mean (sd)	93 (14.9)	272 (201.3)	37.4 (9.3)	112.0 (11.5)	79.3 (8.5)	87.4 (14.6)
Olanzapine						
Median	96.0	174.0	49.0	108.0	78.0	83.0
Mean (sd)	96.6 (16.0)	179.5 (115.6)	47.6 (14.0)	112.7 (14.4)	78.1 (8.7)	85.2 (9.8)
Risperidone						
Median	87.0	119.0	42.0	114.0	72.0	77.5
Mean (sd)	87.5 (11.0)	165.3 (131.2)	41.7 (11.5)	113.1 (9.2)	72.6 (8.7)	75.8 (8.7)
Haloperidol						
Median	100.0	149.0	34.0	116.0	76.0	82.0
Mean (sd)	99.5 (16.0)	182.9 (111.6)	37.1 (10.0)	116.1 (14.2)	74.7 (11.1)	88.6 (27.3)
Phenothiazine⁽²⁾						
Median	96.0	153.0	40.5	110.0	77.0	81.0
Mean (sd)	97.2 (17.2)	196.8 (135.0)	42.2 (14.9)	114.0 (13.8)	76.0 (8.7)	87.3 (28.3)
Lithium						
Median	100.5	192.0	38.5	110.0	76.5	86.5
Mean (sd)	100.8 (17.4)	192.5 (84.5)	38.7 (9.0)	113.5 (18.4)	71.0 (12.1)	100.2 (42.8)
Valproic acid						
Median	96.0	154.0	38.0	118.0	77.0	81.0
Mean (sd)	97.0 (12.1)	188.9 (124.1)	36.6 (9.3)	115.4 (14.7)	74.5 (9.4)	81.2 (11.4)
Carbamazepine						
Median	90.5	197.0	45.5	110.0	78.0	78.0
Mean (sd)	90.8 (10.9)	185.3 (81.1)	47.8 (13.3)	122.4 (25.0)	77.3 (14.8)	79.9 (12.5)

¹Considering only patients with present use of those drugs for at least 30 days or if the medication was in current use for less than 30 days in addition to having a history of past use for at least 30 days

²Phenothiazines: include chlorpromazine, levomepromazine and thioridazine

disturbances associated with MS in schizophrenic outpatients in use of antipsychotics found a high percentage of overweight patients, and increased prevalence of dyslipidemia.²⁶ Considering that the prevalence rates of DM and obesity in Brazil^{27,28} are lower than those in United States,^{19,27} we can estimate that the prevalence of MS in our country is inferior to the prevalence of MS (23.7%) found in that country. Thus, the prevalence of MS found in this study (29.4%) is probably higher than that of the general population.

The female gender was significantly associated with a higher prevalence of MS in our study. This result is in accordance with data obtained from the initial assessment of 689 patients included in the *Clinical Trials of Intervention Effectiveness* (CATIE) Schizophrenia Trial, in the United States. In this study, the prevalence of MS (by NCEP criteria) was 51.5% for women and 36% for men ($p = 0.002$).¹² In Canada, Cohn et al. also found a higher prevalence of MS in women in a sample of 240 patients (48.5% versus 42.6%), but this difference was not statistically significant.¹⁰

The use of lithium is also associated with a higher prevalence of MS, which is probably due to the diagnostic criterion of abdominal circumference, where the highest mean and median were found, in comparison with other medication. It is known that weight gain is a frequent side effect of lithium, reaching above 10 kg in 20% of patients.¹⁸ The direct action of lithium on insulin resistance is controversial. There are studies that associate its prolonged use with the lowering of glucose tolerance.²⁹ However, Vestergaard & Schou found just one case of DM in a group of 226 patients with bipolar disorder who were using lithium for up to 6 years.³⁰ In our study, the mean glycemic values of the patients using lithium is above the new cutoff point of 100 mg/dl, proposed by the IDF.⁵ This elevation may be explained by the presence of three patients with very high glycemic values, two of which had had a previous

diagnosis of DM. One of these was in concomitant use of chlorpromazine and presented a history of past use of valproic acid, olanzapine and risperidone.

The prevalence of MS in patients with schizophrenia or schizoaffective disorder (31.8%) was lower than the values between 42.4% and 62.5% found in North America,⁹⁻¹³ and to the values of 34.6% and 37.1% found in Sweden¹⁴ and in Finland.⁸ One study, in Belgium, found a prevalence of 28.4%, slightly lower than the value found here; this prevalence, though, is twice the reference value for that country.¹⁵ Other study, in Finland, only assessed patients at the age of 30-32 years old and found a prevalence of 19.4%; the difference could be explained by the significantly younger age of that group.¹⁶

We found only one study in the literature on patients with bipolar disorder, with a prevalence of MS of 30%.¹⁷ In our study the prevalence found was a bit higher (38%). There are no studies on patients with depression yet. The only study related to depression found assessed young adults (17 to 39 years old) with a history of depression and found prevalence of 12.3% for women and 11.7% for men.³¹ As to the present study, much higher levels of prevalence were found (52.9% and 40.0% respectively); however, the study was based on hospitalized patients in a depressive episode.

The lower prevalence of MS found in alcoholic patients is in accordance with data from the literature that demonstrates that the use of alcohol is a protective factor for the occurrence of MS, although this protective effect tends to diminish in patients with a more intense use of alcohol.³²⁻³⁵

Some findings related to the association between the psychiatric diagnoses and the components of MS, seen separately, stand out. The elevated values of abdominal circumference in women and of triglycerides in both genders can be pointed out. The means and medians of fasting glucose

kept within normal limits for all diagnostic categories; only 8.8% (n = 15) of the patients presented elevated fasting glucose values (> 110 mg/dl). However, the mean glycemic values of the male patients with a diagnosis of depression can be considered elevated, if we use the cutoff point of 100 mg/dl. This elevation is due to two diabetic patients, with glycemic levels above 190 mg/dl. Both patients were using lithium and one of them was also using chlorpromazine and had a history of past use of olanzapine, risperidone and valproic acid. Low values of abdominal circumference and high levels of HDL were found among male alcoholics, which is in accordance with the literature.^{33,34} Of the 12 patients with HDL values higher than 70 mg/dl, 11 had alcoholism as the primary diagnosis or comorbidity.

The results of this study should be seen cautiously regarding the association of MS with medication in use. The small number of patients using a particular medication, especially clozapine and olanzapine, made an adequate analysis difficult. Variables, such as time of use and concomitant use or previous use of other drugs, were not controlled.

Other methodological questions must be pointed out. The diagnosis used was that which was affirmed by the attending physician and each patient was not rediagnosed when assessed by the study. Only hospitalized patients were assessed and the results cannot be generalized for outpatients or patients who have been stabilized. Psychiatric patients frequently abandon their psychopharmacological treatment and this is an important cause of hospitalization. Thus, one can suppose that many of the patients evaluated had not been using their medication in the weeks or months that preceded their hospitalization. Finally, hospitalization is not the best moment to evaluate metabolic disorders, since the diet changes and the changes in physical activity interfere in these parameters.

Conclusions

The prevalence of MS among patients hospitalized in an acute psychiatric ward of a general hospital in Brazil was 29.4%. Taking the Brazilian population as a reference (indirect estimate), this value is elevated. The prevalence found in alcoholic patients (5.1%) was significantly lower than the prevalence in patients with other psychiatric diagnosis. After multivariate analysis, the female gender and the use of lithium were factors significantly associated to the diagnosis of MS.

These preliminary data indicate the need for new epidemiological studies on the relationship between MS and mental disorder. Future studies should be undertaken to evaluate the role of the pharmacological treatment in the genesis of MS. Finally, it should be stressed that there is a need to routinely search for the presence of MS in these patients, which will allow preventive and therapeutic measures to be taken in relation to this metabolic disorder.

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