



Metabolic Syndrome in Patients Suffering From Schizophrenia in Mumbai, India- Study of Demographic, Anthropometric and Clinical Variables

KEYWORDS

schizophrenia, metabolic syndrome, India

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ABSTRACT In India, very few studies have tried to study the association of metabolic syndrome (MS) with demographic, anthropometric and clinical variables among patients suffering from schizophrenia. This study was undertaken to determine the prevalence and evaluate MS in schizophrenia. 133 outpatients attending the psychiatry department of a general hospital in a tier 1 city (Mumbai) in India and suffering from schizophrenia (DSM IV) were evaluated for demographic, anthropometric and clinical variables and presence of MS as per the National Cholesterol Education Program-Adult Treatment Panel III criteria. The prevalence of MS was 18.8% (M: 44%, F: 56%). MS prevalence was statistically significantly higher in female subjects ($P=0.043$), those over 40 years ($P=0.002$) and in those suffering from schizophrenia for more than five years ($P=0.008$). Screening patients for MS by non invasive interventions like waist circumference measurement and preventive measures for MS in patients suffering from schizophrenia is suggested.

Introduction:

Those who suffer from schizophrenia have an approximately 20% shorter life expectancy than that of the general population. [1] Cardiovascular disease (CVD) is the most common cause of natural mortality in schizophrenia, accounting for a total of 34% of deaths among male patients and 31% of deaths in female patients and is surpassed only by suicide. [2] The major risk factors for CVD include obesity, dyslipidemia, hypertension and hyperglycemia. [3] These risk factors are key elements defining the MS. [4]

Metabolic syndrome, also called syndrome X, [5] or the insulin resistance syndrome, [6] includes five major features: 1) abdominal obesity, 2) hypertriglyceridemia, 3) low high-density lipoprotein (HDL) cholesterol, 4) high blood pressure (BP) and 5) high fasting glucose. [4] A high prevalence of MS has been reported in schizophrenia. [7, 8, 9] It has been predicted that approximately 50% of patients may develop MS. [10] In India, very few studies have tried to study the association of MS with demographic, anthropometric and clinical variables among patients suffering from schizophrenia. [11]

This study was undertaken to study the 1) prevalence of MS in schizophrenia, 2) to study the association between MS and demographic, anthropometric, clinical profile of patients.

Materials and method-

The study was conducted in psychiatry department of a general hospital in a tier 1 city (Mumbai) in India. Clearance was obtained from the Institution Ethics Committee. Informed consent was obtained from each study subject. Subjects were 133 consecutive outpatients who were diagnosed with schizophrenia, based on the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) [12] diagnoses. In the presence of a reliable and complete informant, patient's data was collected for demography- gender, age, religion, marital status, education, (those who had education of high school certificate (XII pass) and above were included in high education) and occupation. Socioeconomic status was calculated using Modified

Kuppuswamy scale. [13] (Class I, II, III was included in upper class and class IV, V in lower class). Clinical history was taken for duration of schizophrenia, past history of hospitalization for schizophrenia, family history of schizophrenia, substance use, medication use (typical/atypical antipsychotics). Anthropometric variables- waist circumference, weight, height were assessed. Patients were evaluated for BP, serum triglycerides, serum HDL cholesterol and fasting blood sugar.

The data was tabulated in excel sheet. MS was diagnosed as per the NCEP-ATP III (National Cholesterol Education Program-Adult Treatment Panel III) guidelines, [4] where MS is defined by presence of any 3 of the following: 1) Abdominal obesity characterized by waist circumference of >102 cm (40 inches) for men or >88 cm (35 inches) for women, 2) Serum triglycerides ≥ 150 mg/dL, 3) Serum HDL cholesterol <40 mg/dL for men and <50 mg/dL for women, 4) BP $\geq 130/\geq 85$ mmHg or taking treatment for hypertension, 5) Fasting glucose level ≥ 110 mg/dL or taking treatment of diabetes.

Statistics- Variables are expressed in frequencies and percentages. The significance of differences in proportion was determined using Chi square test. The P values were two tailed and probability level for significant difference was set at $P < 0.05$.

Results-

25 patients (18.8%) had MS.

Table-1 shows association of gender, age, duration of schizophrenia and use of drugs with MS.

Table-1

Variable (n=133)	With MS n=25(18.8%)	Without MS n=108 (81.2%)	P value
Gender			P=0.043
Male (n=82: 61.65%)	11(44%)	71(65.74%)	
Female (n=51: 38.35%)	14(56%)	37(34.26%)	

Age(years)	≤40 (n=79: 59.4%)	8(32%)	71(65.74%)	P=0.002
	>40 (n=54: 40.6%)	17(68%)	37(34.26%)	
Duration of schizophrenia (years)	>5 (n=81: 60.9%)	21(84%)	60(55.56%)	P=0.008
	≤5 (n=52: 39.1%)	4(16%)	48(4.44%)	
Drugs	Atypical/ atypical+ typical (n=97: 72.93%)	21(84%)	76(70.37%)	P=0.166
	Typical (n=36: 27.07%)	4(16%)	32(26.63%)	

Demographic variables- MS was statistically significantly more prevalent in females compared to males (27.45% versus 13.41%) and in those aged >40 years compared to those who were younger (31.48% versus 10.13%). There was no statistical association among other demographic variables and MS. Religion wise majority of patients were Hindu (n=89: 66.92%). Majority patients were married (n=80: 60.15%), had higher education (n=109: 81.95%), were unemployed (n=82: 61.65%) and were from lower socio economic status (n=73: 54.89%).

Clinical variables- MS was statistically significantly more prevalent in those suffering from schizophrenia for more than five years compared to those with shorter duration of illness (25.93% versus 7.69%, P=0.008). MS was more prevalent in those who had past history of hospitalization for schizophrenia (n=110: 82.71%), in those who did not have family history of schizophrenia (n=108: 81.2%), in those who did not have any substance use (n=81: 60.9%) and in those taking only atypical antipsychotics for treatment of schizophrenia but findings were not statistically significant.

In the present study the frequency of MS components in patients was as follows- Of 25 patients (18.8%) who had MS as per the NCEP-ATP III criteria, 15 patients (11.28%) had three variables abnormal, 9 patients (6.77%) had four abnormal variables and one patient (0.75%) had all 5 variables abnormal. 75 patients (56.39%) had subsyndromal MS with 22 patients (16.54%) satisfying two out of five NCEP-ATP III criteria and 53 patients (36.84%) fulfilling one out of five criteria. Only 33 patients (24.81%) had all components of MS in normal range.

Table 2 shows association of components of metabolic syndrome and Body Mass Index (BMI) in patients with/without MS.

Table-2

Variable	n=133	With MS n=25 (18.8%)	Without MS n=108 (81.2%)	P value
Waist circumference	Increased (n=23: 17.29%)	17(68%)	6(5.6%)	P<0.000
	Normal (n=110: 82.71%)	8(32%)	102(94.4%)	

Serum triglyceride	Raised (n=19: 14.29%)	13(52%)	6(5.6%)	P<0.000
	Normal (n=114: 85.71%)	12(48%)	102(94.4%)	
Serum HDL cholesterol	Reduced (n=90: 67.67%)	24(96%)	66(61.1%)	P=0.000
	Normal (n=43: 33.33%)	1(4%)	42(38.9%)	
Fasting blood sugar	Raised (n=30: 22.56%)	18(72%)	12(11.1%)	P<0.000
	Normal (n=103: 77.44%)	7(28%)	96(88.9%)	
BP	Raised (n=25: 18.8%)	14(56%)	11(10.2%)	P<0.000
	Normal (n=108: 81.2%)	11(44%)	97(89.8%)	
BMI	Raised (n=41: 30.83%)	18 (72%)	23 (21.3%)	P<0.000
	Normal/decreased (n=92: 69.17%)	7 (28%)	85 (78.7%)	

Each component of metabolic syndrome was extremely statistically significantly associated with the full syndrome. Raised BMI was also extremely statistically significantly associated with presence of MS. The likelihood of MS when waist was increased compared to when waist was normal was 73.92% versus 7.27%, when Serum triglyceride were raised, it was 68.42% versus 10.52%, when Fasting blood sugar was raised, it was 60% versus 6.8%, when BP was raised it was 56% versus 10.19%, when BMI was raised it was 43.9% versus 11.29% and when Serum HDL cholesterol was reduced it was 26.67% versus 2.35 %.

Among the components of MS, the most frequent abnormality was reduced HDL cholesterol (67.67%) and the least frequent abnormality was elevated serum triglycerides (14.29%)

Table-3 shows gender difference in components of MS and BMI

Table-3

Variable	Males (n=82: 61.65%)	Females (n=51: 38.35%)	P value
Waist circumference	Increased (n=5: 6.1%)	Increased (n=18: 35.29%)	P <0.000
	Normal (n=77: 93.9%)	Normal (n=33: 64.71%)	
Serum HDL cholesterol	Reduced (n=46: 56.1%)	Reduced (n=44: 86.27%)	P=0.000
	Normal (n=36: 43.9%)	Normal (n=7: 13.73%)	
Fasting blood sugar	Raised (n=15: 18.3%)	Raised (n=12: 23.53%)	P= 0.465
	Normal (n=67: 81.7%)	Normal (n=39: 76.48%)	
BP	Raised (n=13: 15.85%)	Raised (n=10: 19.6%)	P= 0.577
	Normal (n=69: 84.15%)	Normal (n=41: 80.4%)	

Serum triglyceride	Raised (n=11: 13.41%)	Raised (n=8: 15.69%)	P= 0.715
	Normal (n=71: 86.59%)	Normal (n=43: 84.31%)	
BMI	Raised (n=26: 31.7%)	Raised (n= 25: 49.02%)	P= 0.045
	Normal/re-duced (n=56: 68.3%)	Normal/reduced (n=26: 50.98%)	

Table-3

There was extremely statistically significant high frequency of increased waist circumference and reduced Serum HDL cholesterol in females compared to males. Raised BMI was also statistically significantly more common in females.

Discussion- this study was undertaken to evaluate MS in patients suffering from schizophrenia. In a cross sectional study, 133 outpatients were evaluated. The prevalence of MS was 18.8%. This is in agreement with other Indian studies. In India, in different studies, the prevalence of MS was in a range of 9–48 %. [14, 15, 16] CATIE study reported a base- line MS prevalence of 42.7% in an US-American sample of patients with schizophrenia. [6] The higher prevalence of MS in patients with schizophrenia may be explained by medication-related, disease-related, and lifestyle-related factors. The prevalence varies around the world and Asian people are more likely to have lower prevalence rates of metabolic syndrome compared with the Westerners due to dietary intake and lifestyle. [17, 18]

MS prevalence was statistically significantly higher in female subjects. This was in line with that reported in the CATIE study. [6] The higher prevalence of MS in females may be due to hormonal differences in the two genders especially of leptin, adiponectin and resistin which along with oestrogen, act to regulate energy metabolism. [19]

Though the prevalence of MS in this study was on the lesser side of other studies, it was found that 75.2% of patients had at least one deranged MS component, the most frequent metabolic abnormality was reduced serum HDL cholesterol (67.67%). The frequency was comparable to other studies. [20, 21, 22]

MS prevalence was statistically significantly higher in those over 40 years, in those suffering from schizophrenia for more than five years. These findings are similar to study of Cerit et al. [23]

Second- generation antipsychotic drugs cause, to a varying extent, dyslipidemia, weight gain, and diabetes. [24] However in this study, there was no statistical relationship between type of drug use (typical/ atypical) or nicotine use and MS. These findings are similar to study of Cerit et al. [23]

The likelihood of metabolic syndrome when waist was increased compared to when waist was normal was 73.92% versus 7.27%. This finding is in line with previous studies that reported waist circumference to be one of the most predictable factors for cardiovascular disease. [25]

Conclusion- The limitations of this study include the cross sectional study design, relatively small size and lack of control group. Despite the limitations, in the present study it

was found that around 1 in 5 subjects had MS and around 3 in 4 subjects had at least one component of MS deranged. Waist circumference was 68.00% (95%CI-46.50% to 85.05%) sensitive and 94.44 % (95% CI- 88.30% to 97.93%) specific for MS in the present study. In view of these findings, measurement of waist circumference in patients suffering from schizophrenia is suggested. It is a non invasive procedure and can be easily assessed. Therapeutic lifestyle changes recommended by NCEP ATP III [4] like weight reduction and increased physical activity may be considered for patients with schizophrenia.

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