RESEARCH ARTICLE

STUDY OF THE ASSOCIATION OF METABOLIC SYNDROME WITH SCHIZOPHRENIA IN NORTH EASTERN PART OF INDIA

AK Verma[1], S Bajaj[1], Sonal Verma[2], A Varma[1], LP Meena[3]
[1]Department of Medicine MLN Medical College, Allahabad, Uttar Pradesh, India
[2]Department of Pathology, K G Medical University, Uttar Pradesh, India
[3]Department of Medicine, Institute of Medical Sciences, Varanasi, Uttar Pradesh, India

Correspondence to: AK Verma (anand.verma.dr@gmail.com)

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ABSTRACT

Background: During last several years there has been growing interest in metabolic abnormalities in Schizophrenia. Studies in this context are lacking in this part of India.

Aims & Objective: To study the association of metabolic syndrome with schizophrenia in North eastern part of India.

Material and Methods: 50 Adult schizophrenic patients diagnosed as per DSM-IV TR Criteria and age and sex matched 50 subjects of control group were included in for prevalence of MetS as per the criteria of the International Diabetes Federation (IDF). Informed consent was obtained. The study was approved by local ethical committee.

Results: Maximum numbers of subjects were in the age group 21-30 years and males were more than female in schizophrenia group. 14 (28%) patients in schizophrenia group and 6 (12%) subjects in control group had MetS. The mean Serum triglyceride of schizophrenia (153.41 ± 57.26) was significantly higher ($p<0.05$). Mean BMI of schizophrenia (22.55 ± 4.19) was higher as compared to control group (22.30 ± 3.35). 38 patients (76%) were taking antipsychotics for more than 6 months of duration, in which 14 patients (28%) were found to be having MetS while 24 patients (48%) had no MetS. 2nd generation antipsychotics were taken by 35 patients (70%) in which 14 patients (28%) were found to have MetS while 21 patient (42%) had no MetS.

Conclusion: This study showed that prevalence of MetS, risk factors, was more in schizophrenia than control group and it was present more commonly in patients taking second generation antipsychotics.

KEY-WORDS: Schizophrenia; Metabolic Syndrome; North Eastern Part of India

Introduction

Psychiatric disorders are associated with increased medical morbidity and mortality.[1] During last several years there has been growing interest in metabolic abnormalities in Schizophrenia.[2] Schizophrenic patients with the metabolic syndrome have higher rates of coronary heart disease, myocardial infarction, and stroke than the same patients with any one of the components of hypertension, insulin-resistance, dyslipidaemia, or obesity.[3] There are number of studies which have found that the risk of metabolic syndrome is greater in those receiving psychotropic medications as compared to the general population.[4,5] Most of the studies have focused on the risk of metabolic syndrome in patients receiving psychotropic medications. Studies in this context are lacking in India. So in this study we plan to see the association of metabolic syndrome with schizophrenia in North eastern part of India.

Materials and Methods

50 Adult schizophrenic patients diagnosed as per DSM-IV TR Criteria visited to the psychiatric OPD in S.R.N. Hospital at M.L.N. Medical College Allahabad and age and sex matched 50 subjects of control group were evaluated for prevalence of MetS as per the criteria of the International Diabetes Federation (IDF). Exclusion criteria: Presence of known medical disease: especially coronary artery disease, hypothyroidism, nephrotic syndrome, liver disorders, Patients suffering from any other chronic Psychiatric illness, Pregnancy/lactation/use of oral contraceptive pills and other confounding medicines. Informed consent was obtained. The study was approved by local ethical committee.

Statistical Analysis

Statistical Package for Social Sciences (SPSS) was used for analysis, and significance level was at P-value less than 0.05. Excel (Microsoft Office 2007) and SPSS (SPSS inc, Chicago) software packages were used for data entry and analysis. The student 't' test was used to determine whether there was a statistical difference between improved and expired subjects in the parameters measured. Proportions were compared using Chi-square test of significance. One way analysis of variance was used to test the difference between groups. In all the above test "p" value of less than 0.05 was accepted as indicating statistical significance.

Results

Maximum numbers of subjects were in the age group 21-30 years and males were more than female in schizophrenia group [Table 1]. 14 (28%) patients in schizophrenia group (n=50) and 6 (12%) subjects in control group (n=50) had MetS. The proportion of subjects were more in patient group having high FBS & S.TG and low S.HDL as compared to control group and these differences were also statistically significant ($p<0.05$). The mean Serum triglyceride of schizophrenia (153.41 ± 57.26) was significantly higher ($p<0.05$) as compared to control group (127.94 ± 30.88). Also, mean values of waist circumference, FBS, BP were higher and HDL was lower in patient group but they were not reached to a statistically significant level. Mean BMI of schizophrenia (22.55 ± 4.19) was higher as compared to control group (22.30 ± 3.35) [Table 2]. 38 patients (76%) were taking antipsychotics for more than 6 months of duration, in which 14 patients (28%) were found to be have MetS while 24 patients (48%) had no MetS. 6 patients (12%) were taking antipsychotics for <6 months of duration, in which no patient was found to be have MetS. 6 patients (12%) were taking no antipsychotics and no MetS was associated with them. 2nd generation antipsychotics were taken by 35 patients (70%) in which 14 patients (28%) were found to have MetS while 21 patient (42%) had no MetS. 9 patients (18%) were taking 1st generation antipsychotics and they had no MetS. 6 patients (12%) were taking no antipsychotics and no MetS was associated with them. Statistically significant difference was found b/t both the patient groups who were taking 1st & 2nd Generation antipsychotics [Table 3].

Table-1: Socio-demographic Variables of Patients and Controls

Variables		Schizo-Phrenia (A) (n=50)	Controls (C) (n=50)	Significance
Age (in yrs)	20-30	20 (40%)	19 (38%)	$\chi2$= 0.830, df=2, p=0.66
	31-40	15 (30%)	19 (38%)	
	41-50	15 (28%)	12 (28%)	
Gender	Male	31 (62%)	32 (64%)	$\chi2$= 0.429, df= 1, p=0.83
	Female	19 (38%)	18 (36%)	
Marital Status	Married	41(82%)	40 (80%)	$\chi2$=0.65, df=1, p=0.799
	Unmarried	9 (18%)	10 (20%)	
Religion	Hindu	48 (96%)	44 (88%)	$\chi2$=2.17, df=1; p=0.14
	Muslim	2 (4%)	6 (12%)	
Domicile	Rural	24 (48%)	14 (28%)	$\chi2$=4.24, df= 1, p=0.039
	Urban	26 (52%)	36 (72%)	
Socio-economic Status	Upper	1(2%)	3(6%)	$\chi2$=3.36, df= 4, p=0.499
	Upper mddle	9 (18%)	9 (18%)	
	Lower middle	21 (42%)	25(50%)	
	Upper lower	17 (34%)	10(20%)	
	Lower	2(4%)	3(6%)	
Education	Illiterate	19 (38%)	8 (16%)	$\chi2$=7.94, df=3; p=0.047
	Up to VIIIth	5 (10%)	3 (6%)	
	IXth - XIIth	12 (24%)	21 (42%)	
	Graduate and above	14 (26%)	18 (36%)	

Table-2: Subjects having Risk Factors on Different Metabolic Syndrome Parameters

Metabolic Syndrome Parameters	Schizo-phrenia (n=50)	Controls (n=50)
Waist circumference (cm) (M≥90,F≥80)	19 (38%)	18 (26%)
Blood Pressure (mm Hg) (≥130/ ≥85)	11 (22%)	11 (22%)
FBS (mg/dl) (≥100)	9 (18%)	2 (4%)
S.TG (mg/dl) (≥ 150)	20 (40%)	10 (20%)
S.HDL (mg/dl) (M <50, F <40)	36 (72%)	22 (44%)
Waist circumference (cm)	82.24 ± 11.3	81.67 ± 10.56
Fasting Blood Sugar (mg/dl)	87.47 ± 20.37	84.83 ± 12.50
Serum HDL (mg/dl)	40.25 ± 7.28	42.74 ± 8.11
Serum Triglyceride (mg/dl)	153.41 ± 57.26	127.94 ± 30.88
Systolic BP (mmHg)	123.84 ± 11.81	120.32 ± 14.09
Diastolic BP (mmHg)	77.12 ± 7.68	76.32 ± 9.11
BMI (kg/m^2)	22.55 ± 4.19	22.30 ± 3.35

Table-3: Comparison of Clinical Variables of Patients having MetS and Patients having no MetS

Clinical Variables		Schizophrenia		Significance
		MetS	No MetS	
Duration of Illness	<6 months	0	4	$\chi2$=1.76, df=2, p=0.416
	7-12 months	1	3	
	>1 year	13	29	
Duration of Treatment	No treatment	0	6	$\chi2$= 6.14, df = 2, p = 0.046
	< 6 months	0	6	
	> 6 months	14	24	
Antipsychotics Used	1st Generation	0	9	$\chi2$= 8.33, df = 2, p = 0.016
	2nd Generation	14	21	
	No treatment	0	6	
Total		14	14	-

Discussion

This research is timely considering that there is no prior published work on metabolic syndrome in schizophrenic patients in North eastern part of India. In the present study, the prevalence of metabolic syndrome was 28% in schizophrenia group and was 12% in control group. These findings are comparable to some other studies.[6,11] Two studies from north India published during 1994 and 2000 showed a prevalence of obesity 17% (Ludhiana) and 15 % (Kashmir) respectively.[8,9] In another study conducted by Martina et al. had shown that prevalence of obesity was found significantly higher in patients with schizophrenia as compared to control.[10] Similar findings were observed in the study conducted by De Hert et al.[11] In our study 19 (38%) patients in schizophrenia group and 18 (36%) in control group have increased waist circumference (i.e. obesity). Mean values of waist circumference in schizophrenia group (82.24 ± 11.30) were higher as compared to control group (81.67 ± 10.56). However statistically significant difference was not found. One study which was conducted in 2002 has shown higher fasting blood glucose in drug naïve patients of schizophrenia as compared to controls.[12] The study had reported that prevalence of diabetes was 15% higher in patient group as compared to controls. The prevalence of FBS (18% schizophrenia and 4% in controls) in patients of this study was significantly higher than the general population. Mean values of fasting blood sugar in schizophrenia group (87.47 ± 20.37) were higher as compared to control group (84.83 ± 12.50). Statistically significant difference was not observed between and control group and schizophrenia. In this study 20 (40%) patients in schizophrenia group and 10 (20%) subjects in control group have increased serum triglyceride. Proportion of subjects having increased s. triglyceride were significantly higher ($p<0.05$) in schizophrenia group as compared to control group. 36 (72%) patients in schizophrenia group and 22 (44%) subjects in control group have low serum HDL. Proportion of subjects having Low s. HDL were significantly higher ($p<0.05$) in patient group as compared to control group. Also in this study mean values of serum HDL in schizophrenia group (40.25 ± 7.28) were lower as compared to control group (42.74 ± 8.11) but statistically significant difference was not observed. Mean values of Serum Triglyceride of schizophrenia group (153.41 ± 57.26) and were significantly higher ($p<0.05$) as compared to control group (127.94 ± 30.88).These findings are comparable with previous studies.[13,14]

In the ICMR study in 1994 involving 5537 individuals (3050 urban residents and 2487 rural residents) demonstrated 25% and 29% prevalence of hypertension (Criteria: >=140/90 mm of Hg) among males and females respectively in urban Delhi and 13% and 10% in rural Haryana.[15] To our best efforts we are not able to find the studies which could mention about the prevalence of hypertension in psychiatric patients in India in relation to metabolic syndrome. Comparing these studies with our study showed 11 (22%) patients in schizophrenia group & 11 (22%) subjects in control group have higher than normal blood pressure (≥ 130/85 mm Hg). Lower prevalence of hypertension in control group may be b/c of in this study the sample size was small & relatively younger age group taken. Mean values of Systolic Blood Pressure (SBP) (123.84 ± 11.81) as well as diastolic Blood Pressure (DBP) (77.12 ± 7.68) of schizophrenia group were higher as compared to control group (SBP - 120.32 ± 14.09; DBP - 76.32 ± 9.11), although statistically significant difference was not observed. Present study showed that mean values of BMI were found higher in schizophrenia group (22.55 ± 4.19) as compared to control group (22.30 ± 3.35). Statistically significant differences were not observed. These observations are similar to other studies.[12,18] Geographical and ethnic variation can also account for lower rate of prevalence. Statistically significant difference was observed in domicile and education of schizophrenic group. Patients having metabolic syndrome belongs more in rural area than in urban area and were more educated as compared to patient group. Statistically significant differences were not observed in other socio-demographic variables such as gender, religion, and socioeconomic status of both the patient groups. The possible reasons for this finding may be small sample size. Although studies have not mentioned directly about relationship of age with metabolic syndrome, but it has been postulated that

prevalence of metabolic syndrome varies directly with the duration of illness, therefore the prevalence of metabolic syndrome was found in higher age group.[16] In one study the prevalence of metabolic syndrome was found 37% in long-term schizophrenics, with a mean age of 45 years.[17] Also in this study the mean age of patients having metabolic syndrome was higher (36.92 years) as compared to the patients having no metabolic syndrome (34.75 years). The lower prevalence (28%) of metabolic syndrome found in this study may partly be due to younger age group.

In a study mean values of SBP, DBP, waist circumference, S.HDL, S.TG & BMI were found significantly higher in patients having MetS as compared to patients having no metabolic syndrome.[18] Our study was also similar. Waist circumference, fasting blood sugar, Triglycerides & BMI were found significantly higher in patients having MetS as compared to patients having no metabolic syndrome. Both Systolic and Diastolic blood pressure was found higher& HDL was lower in patients with metabolic syndrome as compared to patients having no metabolic syndrome. However the differences were not statistically significant.

Although the mean duration of illness (DOI) was longer in patients with metabolic syndrome as compared to the patients having no metabolic syndrome but the difference did not reach to the statistically significant level. The above mentioned finding is similar to the conclusions of the study conducted by Ford et al.[16] Where the prevalence of metabolic syndrome was higher in patients with longer duration of illness. 38 patients (76%) were taking antipsychotics for more than 6 months of duration, in which 14 patients (28%) were found to be have MetS . No patient has MetS who had taken antipsychotics for less than 6 months of duration. These findings are more or less similar to one group of investigators that found that people with schizophrenia (both those with first episodes and those chronically exposed to conventional medications) have more than three times as much intra-abdominal fat as controls matched for age, gender and lifestyle and that 6 months of treatment with either olanzapine or risperidone, although increasing body mass index, does not significantly increase visceral fat stores.[12,19] Recent studies suggest that the syndrome is increased in people with schizophrenia and in particular in those taking the SGA drugs such as olanzapine and clozapine.[20] Our study was also similar. All the patients having metabolic syndrome were taking second generation antipsychotics (clozapine, olanzapine). This was statistically significant ($p<0.05$). Statistically significant differences were not observed among the majority of socio-demographic parameters between patient and control group. Maximum numbers of subjects were in the age group 21-30 years in all the groups and males were more than females in schizophrenia group. Statistically significant difference ($p<0.05$) was found in domicile and education of the patient group. Control group were more significantly ($p<.05$) belongs to urban area when compared with the patient group. Subjects in control group were more educated as compared with patient group. The possible reason for this difference may be because of illness the subjects of patient group were not able to study or have stopped their studies. There was no significant difference observed in religion, marital status and socioeconomic status of patient group and control group. The reason behind this may be because all the subjects of patient as well as control group belong to the same geographical area. These patients have further increased risk of metabolic syndrome due to unhealthy lifestyle issues, e.g. poor diet, lack of exercise and cigarette smoking, which are known to have higher prevalence in these patients than in the general population. Findings of this study could not be corroborated because the studies on this category of patients are deficient in India.

There are some limitations of this study. Due to the constraints of a time bound study and because of the stringent selection criteria, the sample size was small and hence the results are subjected to Type II error and they cannot be generalized. The study is a cross-sectional study and to further assess the effect of psychotropic medication on metabolic syndrome longitudinal studies are needed. In this Study the prevalence of metabolic syndrome was found low may be because of small sample size. Therefore, further studies containing large number of subjects both in patient and

control group are needed to assess the prevalence of metabolic syndrome in such patients.

Conclusion

This study showed that prevalence of MetS, risk factors, was more in schizophrenia than control group and it was present more commonly in patients taking second generation antipsychotics. Although further studies containing large number of subjects both in patient and control group are needed to assess the prevalence of metabolic syndrome in such patients.

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