PARI	EA - INDIAN JOURNAL	JF RESEARCH VOLUME		1-2230-1991 IF : 5.701 IC Value : 79.90			
PARIPET OF REAL		IGINAL RESEARCH PAPER		Psychiatry			
		Prevalence of Metabolic Syndrome among ents of Schizophrenia: A Cross Sectional, pital Based Study		KEY WORDS: Life-style, Metabolic Syndrome, Schizophrenia, Out-Door Patient			
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ABSTRACT	 Introduction: Schizophrenia is one of the most common mental illnesses encountered in psychiatry. This study aimed to find the prevalence of metabolic syndrome as per the criteria of National Cholesterol Education Programme - Adult Treatment Panel – III and Association between Metabolic Syndrome (MS) and different clinico-demographic variables. This type of baseline study is lacking in eastern India. Material and Methods: The study was conducted in the out-patient department of Calcutta National Medical College and Hospital between February2014 and January 2015. One hundred and twenty (120) patients of schizophrenia were interviewed by predesigned, pre-tested questionnaire, examined clinically, and relevant biochemical examination conducted. The data collection was cross-sectional in nature. Results: Among 120 patients, 39 had developed MS (32.5%). The prevalence of metabolic syndrome among male was 25.4% and in female39.3%. Age (Young adults), lifestyle (diet and exercise level), co-morbid medical illness and amount of drug exposure found to be statistically significant. But concurrent substance abuse, type of antipsychotic taken and duration of drug intake found to be statistically non-significant. Conclusion: Higher prevalence of MS among females elicited in this study should help us to select proper drug in this population along with advice regarding lifestyle changes to prevent development of this catastrophic syndrome. 						
Intro Schize patier diagn Meta	duction ophrenia is one of the m nts attending psychiatry OF osed by DSM - 5 and ICC bolic Syndrome (MS) exist.	ost common mental illnesses of 'D. Mental illnesses are commonly D. Different definition criteria of	were also studied (1. Impaired glucose intolerance-a->clozapine 6 months to 5 years, b->for olanzapine time course not established; 2. Dyslipidemia-a->clozapine 5 years, b->olanzapine - 3-4 months to 1 year. ¹⁰ A study conducted by Matto and Singh (2007) on inpatients of PGI, Chandigarh receiving antipsychotics showed a prevalence of 37.8% using IDF criteria. ¹¹				
Accor Treat define	raing to National Choleste ment Panel- III (NCEP-ATP I ed by presence of any 3 crite ve criteria are as follows	roi Education Programme - Adult II, widely used worldwide), MS is eria out of 5.	The present study was intended to find the prevalence and select demographic and clinical correlates of MS in schizophrenic patients attending psychiatric outdoor of Calcutta National Medical College & Hospital as this sort of baseling study is lacking				
The five criteria are as follows.			incurcal college & Hospital	i as this solit of baseline study is lacking			

- A Central Obesity Waist Circumference in male is \geq 94cm, female \geq 80 cm (Indian context -90 and 80 cm respectively).
- B Fasting Blood Sugar > 100 mg/dl
- $C Triglyceride \ge 150 mg\%$ or on specific treatment
- D Dyslipidemia (HDL: Male < 40 or Female < 50 mg% or under specific treatment)
- E Hypertension > 130/85 mm Hg

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If a patient possesses MS, the risk of diabetes, heart disease and stroke increases. Further it has been seen that Indian population has an increased susceptibility of developing diabetes. Also the prevalence of cardiovascular disease is quite high.¹

MS-patho-physiology remains obscure but it has been hypothesized to involve insulin resistance and pro-inflammatory states, ³, ⁴ genetic susceptibility, lack of physical activity, intake of high fat diets like junk foods, intake of alcohol, smoking etc. 5 Nowadays the contributory role of different antipsychotics are immensely studied, as it has been seen that different antipsychotics, which are to be taken on a long term basis, have potential of causing MS (Clozapine and Olanzapine most, Ziprasidone and Aripiprazole least). 6,7,8,9

Different studies indicate that prevalence of MS in India using NCEP-ATP-III criteria is low. Moreover the fact is that Indian patients usually have a lower body weight compared to European and American counterparts and this situation makes it difficult to extrapolate available data to the Indian context.

Time duration of different antipsychotic propensity to cause MS

in eastern India. It can also highlight whether the duration of illness has any influence on developing MS.

Materials and Methods

This was a hospital based observational, cross sectional study conducted in the Psychiatry Outpatient Department of the Calcutta National Medical College & Hospital over a period of one year during February 2014 to January 2015. The study population selected from diagnosed schizophrenic patients (by DSM-5) attending Out Patient Department of CNMCH. Inclusion criteria were the schizophrenic patients in the age-group of 18 to 65 years. The exclusion criteria were non-willingness, any organic etiology or concurrent substance use disorder precipitating the psychosis as well as intake of any drug which can cause Metabolic Syndrome like steroid, Oral Contraceptive Pills, Valproate etc.

Sampling technique applied in the study population was done by systematic random sampling. Sample size has been calculated using Epi-Info version 6 (CDC, Atlanta) software. For the purpose of measurement of MS, NCEP-ATP-III criteria were used.

After getting permission from Institutional Ethics Committee, each and every tenth patient, attending Psychiatry OPD diagnosed with schizophrenia and fulfilling the selection criteria were included in this study. Then each patient was interviewed by pre-designed pretested, structured schedule regarding their socio-demographic profile, lifestyle, presence of concurrent medical history. Lifestyle pattern was thoroughly evaluated (DIET- according to Indian Council of Medical Research (ICMR) guideline and physical activity measured by Global Physical Activity Questionnaire). Patients

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were then physically examined (height, weight, waist circumference and blood pressure measurement with the help of measuring tape. weighing machine, sphygmomanometer etc.) and necessary biochemical tests (Measurement of FBS and Lipid profile - Triglyceride, HDL, Cholesterol) at CNMCH laboratory, Biochemistry department.

Subjects met the criteria of MS as per NCEP-ATP-III if they fulfilled the criteria of waist circumference > 90 cm for males and > 80 cm for females and 2 or more of the following criteria, namely elevated TG \geq 150 mg/dl, decreased HDL < 40 mg/dl for males and 50 mg/dl for females or receiving treatment, elevated blood pressure \geq 130 mm Hg systolic or 85 mm Hg diastolic.

Statistical Analysis: Statistical analysis was done using SPSS (version 15.0). The frequency of various categorical variables and mean and standard deviation of numerous numerical variables are assessed by chi-square test or Monte Carlo 2-sided Fisher Exact test. Quantitative variables assessed by Pearson chi-square [Asymptotic Significance (2-sided)] and by t-test (2-tailed significance-Equal variances not assumed). p-values less than 0.05 were taken as statistically significant.

Results:

Occurrence: Among total 59 male patients & 61 female patients (total 120 patients) Metabolic Syndrome (MS) occurrence was observed in 39 patients (32.5%). **Gender Distribution:** 15 out of 59 male subjects showed presence of MS (25.0%) and in females it is 24 out of 61 patients (39.0%).

Age: Among age between 18 to 65 years included in the study (Age ranges were divided in five categories 18 - 28 yrs: Young; 29 - 38 yrs: Young adults; 39 - 48 yrs: Adult; 49 - 58 yrs: Early old; 59 - 65 yrs: Old). Age factor was found to be statistically significant. Young adults (29 - 38 years) were found to develop MS more (60.8%).

Table 1: Distribution of patients according to MS and age

Category Metabolic Syn	drome I	No Metabolio	Syndrome		
Age in yrs 38.18	3 ±2.291	46 ± 1.772			
Levene's Test of Equality of	Variance	Significance:0.626			
t-test for equality of means					
	t	df	Significanc		
			e (2-tailed)		
Equal variances assumed	2.599	118	.011		
Equal variances not assumed	2.700	82.961	.008		

Diet:

Three types of dietary intake were evaluated a) high, b) low and c) average calorie diet. High calorie intake contributed (54%) much more in causing Metabolic Syndrome than low calorie intake (12.9%). Of which high calorie intake were associated with more occurrences of MS and this association was statistically significant (p < 0.05).

Exercise Level

Sedentary lifestyle contributed more in causing MS than moderate & extremely active patients. Sedentary lifestyle contributed much more (44%) than extremely active persons (5.3%). This sedentary lifestyle was found to be statistically significant (p < .05).

Drug Intake

Though this variable was found not to be statistically significant, but second generation Anti-psychotics were found more attributing in causing MS than 1st generations. Among 2nd generation Anti-psychotics, olanzapine (48.0%) or clozapine (42.0%) contributed more MS than ziprasidone, aripiprazole & amisulpride.

Metabolic Syndrome and Amount of Exposure: Metabolic Syndrome and Amount of Exposure (Amount of antipsychotic intake multiplied by duration of its intake) has been analyzed to assess their association. Amount of exposure was found associated and this association was statistically significant (p < .05). Table 2 was produced to clarify it in its own way.

Table 2: Distribution of patients according to MS and amount of exposure

Category Metabolic Syn	drome N	o Metaboli	c Syndrome				
Amount of exposure 137	06.46 ± 3106.477		3859.97 ±				
-			1042.542				
Levene's test of Equality of Variance Significance 0.000							
t-test for equality of means							
	t	df	Sig.(2-tailed)				
Equal variances assumed	-3.593	103	.001				
Equal variances not assumed	-3.005	46.696	.004				

Discussion:

The present study shows prevalence of MS is 32.5 percent, more common in females (39%) than males (25%) and commonly associated with use of 2^{nd} generation antipsychotics. Amount of exposure and lifestyle pattern, comorbid medical illness, age were found to be statistically significant. Compared to Western studies, the finding of this study varies. When the result was compared to studies done on Indian population, this didn't varied much.^{11,12}

Another finding was that association of intake of particular Olanzapine and occurrence of M.S. was not found statistically significant, which is common finding in western studies.⁷ These variations may be due to a) Genetic vulnerability difference. The fact is that Indian patients usually have a lower body weight compared to European and American counterparts. A Delhi based study ¹³ (emphasized the fact that patients who have SNP involving leptin gene were susceptible to develop MS; b) Socio-cultural difference in dietary habits and level of exercise; c) an inherent susceptibility of schizophrenic patients to develop MS than not mentally ill patients; c) compliance of drug intake should also be taken into account, as majority of this study population were from rural areas and due to their ignorance about nature of disease and consistent drug intake;

Limitation:

There were few limitations in this study.

a) Small sample size; b) Control groups were not taken. Comparison with age matched population taken from the relative of the patient or other chronically ill patients were not taken. Other chronic physical disability itself can disturb the lifestyle. c) As study conducted in a tertiary care hospital and many of the patients had been treated with different antipsychotics before with variable duration and subsequently referred here, many of them entered into this study with an existing metabolic load. Moreover many of the patient's informants poorly recalled anti-psychotic exposure history.

Conclusion:

It was quite evident from the study that occurrence of MS in patients suffering from schizophrenia was more common in young and female patients. Treatment with certain 2nd generation antipsychotics like olanzapine and clozapine contributed more in causing MS over other 2nd generations or 1st generation antipsychotics. Moreover the offending agents showed clear association with the amount of exposure (product of drug dosage and duration of intake). The contribution of leading a particular life-style like consuming high calorie diet and maintaining a sedentary/low physical activity was found to be immense. Maintenance of sedentary lifestyle might be more in patients suffering from negative symptoms as well as also n patients suffering from positive psychotic symptoms

Recommendation:

While treating these schizophrenic patients, proper selection of drug is of paramount importance as well as lifestyle education should properly be done along with possible other protective measures so as to prevent development of Metabolic Syndrome which can cause major health threat as well as increase the morbidity.

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