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Metabolic Syndrome in Schizophrenia Patients on Antipsychotics: A Cross-Sectional Study

Dr. Garikimukku Swetha[1], Dr. Gorrela Venkata Ramana Rao[2*], Dr. Anga Venkata Suresh[3]

[1]*Assistant Professor, Department of Psychiatry, GSL Medical College, Rajahmundry, Andhra Pradesh, India.*
[2]*Associate Professor, Department of Psychiatry, ASRAM Medical College, Eluru, Andhra Pradesh, India.*
[3]*Assistant Professor, Department of Community MEDICINE, NRI Institute of Medical Sciences, Visakapatnam, Andhra Pradesh, India.*
Email: doctorsuresh2013@gmail.com

CORRESPONDING AUTHOR: Dr. Gorrela Venkata Ramana Rao,
Email address: gvrraomd@gmail.com
Telephone number: 9949022548, 08816222528.

Abstract

Background: Schizophrenia patients on antipsychotics tend to have high prevalence of metabolic syndrome which is of a major health concern. And it may affect drug compliance and cause negative impact on course and outcome of the illness.

Aim: To know the prevalence of metabolic syndrome in schizophrenia patients on antipsychotics and its association with various clinical parameters.

Materials and Methods: Study sample included schizophrenia patients on antipsychotics at least for a period of 1year and various parameters like blood pressure, fasting blood sugar, triglycerides, high-density lipoprotein, and waist circumference were measured. Adult treatment panel III a guidelines was used for diagnosing metabolic syndrome. ICD-10 Diagnostic Criteria for Research (DCR-10) was taken to diagnose Schizophrenia.

Results: The prevalence of metabolic syndrome in the study group was found to be 11.66%. In the study group metabolic syndrome was more common among those using olanzapine (18.7%) and the mean duration of illness was more in persons with metabolic syndrome (3.76 ± 3.58) years compared in those without metabolic syndrome (3.14 ± 1.06) years. The mean duration of treatment in study population was more in persons with metabolic syndrome (3.01 ± 1.04) years.

Conclusion: This study has found that metabolic syndrome was more in people using olanzapine and its prevalence increases with the duration of illness and duration of treatment.

Keywords: Schizophrenia, Metabolic syndrome, Antipsychotics.

Introduction

Schizophrenia is a severe mental illness with 1% prevalence globally and its incidence is 1.5 per10,000 people. (McGrath et al., 2008) Patients with schizophrenia are reported to have 20% shorter life span compared to general population. (Osby et al., 2000; Hennekens et al., 2005) This could be due to high prevalence of diabetes, coronary artery disease, hypertension and other lifestyle diseases. The unhealthy life style habits of many schizophrenic patients like poor diet, nicotine and cannabis smoking, excessive alcohol consumption are believed to contribute to the high mortality. (Marder et al., 2004)

Development of novel antipsychotics has begun a new chapter in the treatment of schizophrenia. Despite their excellent therapeutic effect some atypical antipsychotics have side effects like weight gain, diabetes,

abnormal changes in serum lipid levels, negative effects on heart, increase in serum prolactin levels and sexual dysfunction. Initially metabolic syndrome was referred to as insulin resistance syndrome as many patients with this disorder were elderly patients with coronary artery disease among whom insulin resistance is a common characteristic. (Reaven et al., 1988)

In 1998, the world health organization (WHO) renamed the disorder as Metabolic Syndrome(MS) and developed the first set of diagnostic standards. (Alberti et al., 1998) Different definitions have been proposed by National Cholesterol Education Program Adult Treatment Panel III, International Diabetes Federation, World Health Organization. (ATPIII et al., 2002; Alberti et al., 2005) (Alberti et al., 1998)

There are very few studies on the prevalence of metabolic syndrome in schizophrenia patients coming from rural and lower socioeconomic background and its relationship to antipsychotic regimen. Majority of these studies have not explored the clinical variables that could contribute to the development of MS in schizophrenia patients on antipsychotics.

Hence, the current study has been undertaken to study the prevalence of metabolic syndrome among those on antipsychotic medication and its association with socio-demographic factors and clinical variables.

Materials and Methods

The study was conducted at a tertiary care hospital. 60 schizophrenia patients diagnosed based on ICD-10 guidelines using antipsychotics for a minimum period of 1 year, aged above 18 years including both male and females were considered for the study. Patients who were pregnant and on oral contraceptives, comorbid substance abuse were excluded from the study. Institute ethical clearance was obtained from the ethics committee. Prior to study informed consent was taken from the patients.

Instruments used in the study were:

1. A self-designed semi structured socio-demographic profile consisting of age, gender, education was applied.
2. Clinical profile sheet was used for the information regarding of duration of illness, type of antipsychotic and duration of the antipsychotic use.
3. The Tenth Revision of the International Classification of Diseases and Related Health problems [ICD -10] Research Diagnostic criteria [DCR-10] was used to diagnose schizophrenia. (World Health Organization., 2004)
4. The Adapted Adult Treatment Panel III-a diagnostic guidelines [ATP III-a]: This Panel was Proposed by American Heart Association for the diagnosis of metabolic syndrome, having 5 items (a) waist circumference for men >90cm and women>80cm, (b) HDL cholesterol for men<40mg/dl and women <50mg/dl, (c) Triglycerides ≥150mg/dl, (d) Blood pressure ≥130/85mmHg, (e) Fasting glucose≥100mg/dl. ATP III-a specifies the diagnosis of metabolic syndrome when central obesity, considered essential marker present with at least 3 of the remaining 4 markers. (Alberti et al., 2005)
5. For the statistical analysis statistical package for social sciences version 21 (SPSS) was used. MS excel 2010 used for data entry and values presented as means, percentages and standard deviations. Chi –square test was used for analysis of categorical data. Student t test was used for comparison of means. For all statistical analysis $P<0.05$ was considered significant.

Results

Socio demographic variables:

Table 1: Association between age and metabolic syndrome

Age group (years)	Metabolic syndrome		Total
	Yes n(%)	No n(%)	n(%)
≤ 20	0	5 (100)	5(8.33%)
21-40	6(17.11)	29 (82.9)	35(58.33%)

41-60	0	17 (100)	17(28.33%)
>61	1(33.33)	2 (66.7)	3(5%)

* Chi-square=5.291, d f=3, p=0.152

From Table 1 it was observed that more than half of the study group follows under 21-40years age (58.33%), metabolic syndrome was found to be more as age increases with no statistical significance.

Table 2: Association between gender and metabolic syndrome

Gender	Metabolic syndrome		Total
	Yes n(%)	No n(%)	n(%)
Male	2(9.1)	20 (90.9)	22(36.66%)
Female	5(13.2)	33 (86.8)	38(63.33%)

* Chi square=0.254, df=1, p=0.636

Majority of the study population were females and metabolic syndrome was more common in females (13.2%) compared to males (9.1%) as shown in Table 2. No statistical significance is observed.

Clinical profile:

Table 3: Association between duration of illness and Metabolic Syndrome

		Mean	SD	t value	P value
Metabolic syndrome	Yes	3.76	3.58	0.457	0.649
	No	3.14	1.06		

In study group it was observed that the prevalence of metabolic syndrome is more in those with more duration of illness (3.76 ± 3.58) years.

Table 4: Association between duration of treatment and Metabolic Syndrome

		Mean	SD	t value	p value
Metabolic syndrome	Yes	4.13	5.03	0.563	0.649
	No	3.01	1.04		

As shown in table 4, though there is no statistical significance mean duration of treatment among the study population was more in persons with metabolic syndrome (4.13 ± 5.03) years compared to persons without metabolic syndrome (3.01 ± 1.04) years.

Table 5: Association between type of antipsychotics and Metabolic Syndrome

Type of antipsychotics	metabolic syndrome		Total	P Value
	No (%)	Yes (%)		
Aripiprazole	2 (100)	0 (0)	2	0.55
Clozapine	1 (100)	0 (0)	1	0.22
Haloperidol	6 (100)	0 (0)	6	0.78
Olanzapine	14 (81.3)	3 (18.7)	16	0.64
Quetiapine	1 (100)	0 (0)	1	0.22
Risperidone	23 (85.7)	4 (14.3)	28	0.77
Olanazapine, Quetiapine	1 (0)	0 (0)	1	0.22
Risperidone, Haloperidol	1 (0)	0 (0)	1	0.22
Risperidone, Olanzapine	1 (100)	0 (0)	1	0.22
Risperidone, Clozapine	2 (100)	0 (0)	2	0.55
Risperidone, Quetiapine	1 (0)	0 (0)	1	0.22
Total	53 (88.3)	7 (11.7)	60	

* Chisquare=3.165, df=10, p=0.977

Table 5 shows that majority of the study population were using Risperidone (46.66%) followed by Olanzapine (26.6%), Haloperidol (10%) respectively. Among the study population metabolic syndrome was more common among olanzapine users (18.7%).

Table 6: Metabolic Syndrome criteria for the patients on antipsychotics

	% of people (n=60)	male and female combined n%/ mean (SD)
Waist Circumference(cm)	48.33(29)	94.21 ± 10.65
High-density lipoprotein cholesterol (mg/dl)	16.67(10)	38.7 ± 5.91
Triglycerides(mg/dl)	20.00(11)	180.42 ± 10.41
Systolic blood pressure(mm Hg)	40.00(13)	139.38 ± 10.66
Diastolic blood pressure (mm Hg)	28.33(15)	92.94 ± 5.88
Fasting blood glucose(mg/dl)	40.00(20)	111.96 ± 15.29

Most of the study group were having increased waist-circumference (94.21 ± 10.65), mean fasting blood glucose levels were (111.96 ± 15.29), 20% were having increased triglycerides levels, systolic blood pressure levels were elevated in 40% with SD of 139.37 ± 10.66 and 16.67% people showed changes in HDL levels.

Discussion:

The current study aimed to know the prevalence of metabolic syndrome in schizophrenia patients. The most commonly reported cause of mortality among schizophrenia patients is cardiovascular diseases which has been linked to high prevalence of metabolic syndrome. Metabolic abnormalities not only have an impact on physical health but also on quality of life, non-compliance and low functional outcome. A serious concern is needed in development of metabolic syndrome in these patients. In the current study the prevalence of metabolic syndrome was found to be 11.7%. As the age increases there is a high chance of developing metabolic syndrome. In this study metabolic syndrome in females was (13.2%) while in men it was (9.1%). Though there is not much difference among male and female patients, a little high rate among female gender may be due to gender specific metabolic profile. (Sugawara et al., 2010). There are a significant number of studies that have shown increased visceral fat distribution, increased insulin resistance and impaired glucose tolerance in drug naïve patients compared with normal controls. (Thakore et al., 2002; Venkatasubramanian et al., 2007; Fernandez-Egea et al., 2009). Prolonged duration of illness affects the lifestyle habits especially patients with negative symptoms having poor dietary habits along with prolonged use of antipsychotics. The underlying mechanism of development of metabolic syndrome due to antipsychotics is complex and multifactorial, involving interplay of different receptors and impaired glucose homeostasis and other factors like antipsychotic poly pharmacy which has become a common clinical practice in treatment of schizophrenia (Correll et al., 2009; Faries et al., 2005; Harrington et al., 2002; Westaway et al., 2016). Antipsychotics have actions at different neurotransmitter receptors causing weight gain and increase in waist circumference which might be due to 5HT2C receptor antagonism and genetic polymorphism in anorectic hormone Leptin (Montastruc et al., 2015; Panariello et al., 2012). Olanzapine increases the concentration of plasma Leptin may be due to increased release of Leptin in peripheral fat tissues and causing increased food intake. Eventually leading to increased weight gain and insulin resistance causing diabetes mellitus (Tagami et al., 2016). Antipsychotic drugs with its action on α1 and α2 receptors and dopamine receptors cause changes in blood pressure due to the receptor interaction with renin-angiotensin-aldosterone system (Arnt et al., 1998; Bymaster et al., 1996; Paulose-Ram et al., 2007; Marco et al., 2005; Shiwach et al., 1998; Alves et al., 2019). As shown in the current study 40% of the study group showed significant changes in the blood pressure. Antipsychotics may affect the lipid metabolism resulting in dyslipidemia causing alteration in triglyceride levels and the dietary and smoking habits in the patients may further cause variations in cholesterol levels

(Ramakrishna et al., 2017). Studies have shown atypical antipsychotics to be having more propensity in developing metabolic disturbances and weight gain as shown in our study. (Allison et al., 2001; Bobes et al., 2003). This study has its limitations to generalize its results firstly due to low sample size and secondly the dietary habits, severity of illness, physical activity were not assessed among the patients which could have an impact in developing metabolic syndrome. As it was a cross sectional study the impact of metabolic syndrome on the course and outcome of the illness could not be assessed.

Conclusion:

This study has shown prevalence of metabolic syndrome to be more among females. MS was common in patients using olanzapine among all antipsychotics of our study. The duration of illness as well as the duration of treatment was more among patients who developed metabolic syndrome. Regular screening for the metabolic syndrome and advice about life style modifications will be of help in better treatment outcomes in schizophrenia patients.

Conflicts of interest:

There are no conflicts of interest.

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