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Original Research Article

Biochemical Study of Metabolic Syndrome in Schizophrenia Patients on Atypical Antipsychotics: A Cross- Sectional Study Conducted at West Bengal, India

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Conflict of interest: Nil

Abstract

Background: Atypical antipsychotics are the cornerstone of schizophrenia management but are increasingly associated with adverse metabolic effects. Metabolic syndrome (MetS) in schizophrenia patients elevates the risk of cardiovascular disease and diabetes, necessitating early identification and monitoring.

Aim: To evaluate the prevalence and biochemical profile of metabolic syndrome among schizophrenia patients receiving atypical antipsychotic therapy.

Methods: This cross-sectional observational study was conducted over one year at a tertiary care hospital in West Bengal. A total of 30 patients diagnosed with schizophrenia and on atypical antipsychotics for at least six months were enrolled using purposive sampling. Clinical data, anthropometric measurements, and fasting blood samples were collected to assess glucose levels, lipid profile, and blood pressure. Metabolic syndrome was diagnosed as per IDF criteria. Statistical analysis was done using SPSS v25.0 with a significance threshold of $p<0.05$.

Results: Metabolic syndrome was present in 43.3% of patients. Central obesity (56.7%), low HDL cholesterol (50%), and hypertriglyceridemia (40%) were the most common abnormalities. Significant associations were found between metabolic syndrome and increasing age ($p=0.041$), longer illness duration ($p=0.019$), and olanzapine use ($p=0.048$), but not with gender ($p=0.402$).

Conclusion: The study underscores a high burden of metabolic syndrome in schizophrenia patients on atypical antipsychotics, particularly olanzapine. Regular metabolic screening, early intervention, and integrated care models are essential for reducing long-term morbidity in this vulnerable group.

Keywords: Schizophrenia, Atypical Antipsychotics, Metabolic Syndrome, Biochemical Profile, Olanzapine, Central Obesity, HDL, India.

Introduction

Schizophrenia is a chronic, disabling psychiatric disorder that affects cognition, emotion, and behavior, with a global lifetime prevalence of around 1% [1]. The management of schizophrenia largely depends on long-term antipsychotic therapy. In recent decades, atypical antipsychotics, also known as second-generation antipsychotics (SGAs), have become the preferred agents due to their favorable neurological side effect profile and better efficacy in addressing negative symptoms [2]. However, despite their therapeutic advantages, atypical antipsychotics are increasingly associated with adverse metabolic effects, contributing to an elevated risk of developing Metabolic Syndrome (MetS). Metabolic Syndrome refers to a constellation of interrelated metabolic abnormalities, including central obesity, hypertension, dyslipidemia, and hyperglycemia. The syndrome is recognized as a major risk factor for cardiovascular diseases (CVD) and type 2 diabetes mellitus (T2DM) [3]. The diagnostic criteria are widely based on standards like the International Diabetes Federation (IDF) and the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III). These criteria emphasize the need for early identification of risk parameters in vulnerable populations such as those with chronic mental illnesses [4]. The global burden of metabolic syndrome is alarmingly high, with prevalence estimates ranging from 20% to 30% in the general population. Among patients with schizophrenia, especially those on atypical

antipsychotics, the risk increases two- to three-fold [5]. Studies from the United States and Europe report a prevalence of metabolic syndrome between 35% and 50% among schizophrenia patients on atypical antipsychotics, particularly with drugs like olanzapine and clozapine [6].

In India, the dual burden of mental illness and non-communicable diseases is increasing, yet data regarding the intersection of metabolic syndrome and antipsychotic use is limited. A multicentric Indian study reported a 37% prevalence of metabolic syndrome in schizophrenia patients on SGAs, significantly higher than in antipsychotic-naïve patients [7]. In West Bengal, emerging hospital-based studies show a rising trend in obesity, glucose intolerance, and lipid abnormalities in patients attending psychiatric clinics, but the data remains scarce and under-reported [8].

Given this background, it becomes imperative to evaluate the biochemical components of metabolic syndrome among schizophrenia patients receiving atypical antipsychotics. The present study aims to bridge this gap by assessing metabolic parameters among such patients attending a tertiary care facility over one year. The findings will not only aid in quantifying the metabolic risk but will also promote routine biochemical monitoring, early diagnosis, and integrated psychiatric-metabolic care. The study also aims to generate preliminary data that may guide future large-scale studies and influence policy frameworks in psychiatric practice.

Materials and Methodology

This hospital-based observational study was conducted over a period of one year in the Department of Psychiatry, ESIPGIMSR and ESIC Medical college and Hospital, Kolkata. The primary aim was to assess the biochemical parameters related to metabolic syndrome among patients diagnosed with schizophrenia and undergoing treatment with atypical antipsychotics.

The study followed a cross-sectional design, where data were collected at a single point in time from eligible participants. A sample size of 30 patients was selected based on feasibility and available outpatient population during the study period. The participants were enrolled using purposive sampling technique, including only those schizophrenia patients who had been on continuous atypical antipsychotic therapy for a minimum of six months.

Patients with pre-existing endocrine disorders, pregnancy, or those on medications that could independently alter metabolic parameters (e.g., steroids, statins, etc.) were excluded from the study. Data were collected through direct interviews, physical examination, and laboratory investigations after obtaining informed consent. A structured data collection form was used to document socio-demographic details, duration and type of antipsychotic use, and relevant clinical history. Anthropometric measurements such as weight, height, and waist circumference were recorded using standard protocols. Blood pressure was measured in the sitting position after adequate rest using a calibrated sphygmomanometer.

For biochemical assessment, fasting venous blood samples were collected in the morning after an overnight fast of at least 8 hours. The samples were analyzed for fasting blood glucose, serum triglycerides, HDL cholesterol, and other relevant parameters in the central biochemistry laboratory using automated analyzers and standardized protocols. The diagnosis of metabolic syndrome was made based on the criteria defined by the International Diabetes Federation (IDF).

All collected data were entered into Microsoft Excel and analyzed using SPSS software version 25.0. Descriptive statistics such as mean, standard deviation, and percentages were used to summarize the variables. Associations between categorical variables were analyzed using chi-square test, while continuous variables were compared using Student's t-test or ANOVA, as appropriate. A p-value less than 0.05 was considered statistically significant.

This study was approved by the Institutional Ethics Committee prior to initiation, and all participants provided written informed consent before enrollment. Confidentiality and ethical standards were strictly maintained throughout the study.

Results

A total of 30 patients diagnosed with schizophrenia and receiving atypical antipsychotics were included in this study. The majority of the participants (46.7%) were in the age group of 31–45 years, followed by equal distribution in the 18–30 and >45 years groups (26.7% each). Males constituted 60% of the sample. Most patients (46.7%) had a duration of illness between 5 to 10 years. Regarding antipsychotic use, olanzapine was the most commonly prescribed agent (40%), followed by risperidone (33.3%) and clozapine (16.7%).

Biochemical evaluation revealed that 33.3% of patients had elevated fasting blood glucose levels, while 40% exhibited hypertriglyceridemia. Low HDL cholesterol levels were observed in 50% of participants, and increased waist circumference was found in 56.7%, indicating a high prevalence of central obesity. Elevated systolic blood pressure was noted in 36.7% of patients. Overall, metabolic syndrome, as defined by IDF criteria, was present in 43.3% of the study population.

Statistical analysis showed that the presence of metabolic syndrome was significantly associated with increasing age (p = 0.041), use of olanzapine (p = 0.048), and longer illness duration greater than 5 years (p = 0.019). However, no statistically significant association was observed between metabolic syndrome and gender (p = 0.402). These findings suggest a considerable metabolic risk in schizophrenia patients treated with atypical antipsychotics, particularly with prolonged use and specific drug types.

Table 1: Demographic and Clinical Details of Study Participants (n = 30)

Variable	Category	No. of Patients (%)
Age (years)	18–30	8 (26.7%)
	31–45	14 (46.7%)
	>45	8 (26.7%)
Gender	Male	18 (60.0%)
	Female	12 (40.0%)
Duration of Schizophrenia	<5 years	10 (33.3%)
	5–10 years	14 (46.7%)
	>10 years	6 (20.0%)
Type of Antipsychotic	Olanzapine	12 (40.0%)
	Risperidone	10 (33.3%)
	Clozapine	5 (16.7%)
	Others (e.g., Quetiapine)	3 (10.0%)

Table 2: Objective-Wise Biochemical and Metabolic Parameters (n = 30)

Parameter	Mean ± SD	Abnormal Values n (%)
Fasting Blood Glucose (mg/dL)	106.8 ± 14.2	10 (33.3%)
Triglycerides (mg/dL)	176.5 ± 36.7	12 (40.0%)
HDL Cholesterol (mg/dL)	38.4 ± 6.5	15 (50.0%)
Waist Circumference (cm)	92.6 ± 8.1	17 (56.7%)
Systolic BP (mmHg)	132.3 ± 12.5	11 (36.7%)
Metabolic Syndrome Present	—	13 (43.3%)

Table 3: Test of Significance – Association Between Metabolic Syndrome and Clinical Variables (n = 30)

Variable	With Metabolic Syndrome (n=13)	Without (n=17)	p-value	Significant
Mean Age (years)	42.1 ± 9.4	36.8 ± 8.7	0.041	Yes
Gender (Male)	9 (69.2%)	9 (52.9%)	0.402	No
Olanzapine Use	7 (53.8%)	5 (29.4%)	0.048	Yes
Duration >5 yrs	10 (76.9%)	6 (35.3%)	0.019	Yes

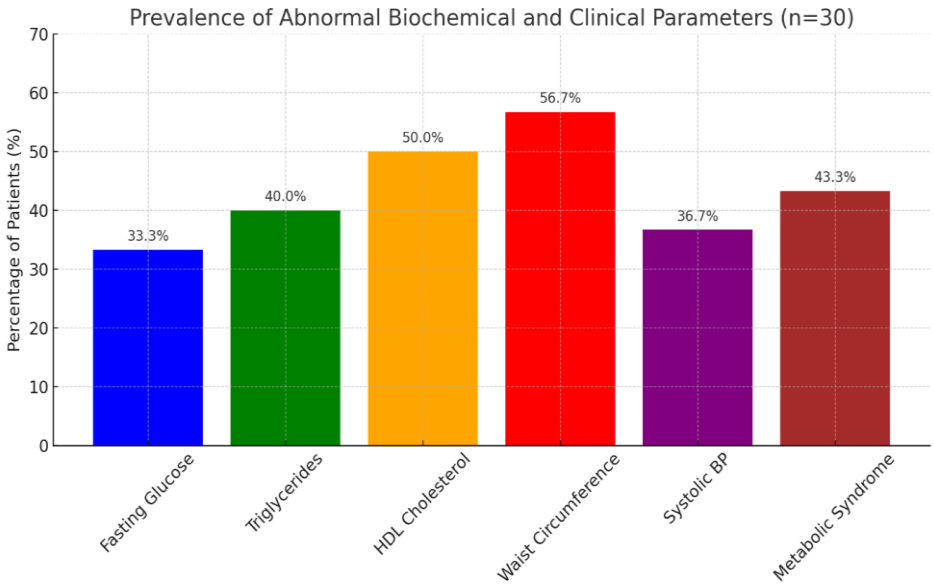

Figure 1: Prevalence of Abnormal biochemical and clinical Parameters (n=30)

Discussion

The current study observed a high prevalence (43.3%) of metabolic syndrome among schizophrenia patients receiving atypical antipsychotic medications. This finding is consistent with the results of Grover et al., who reported a metabolic syndrome prevalence of 42.6% among Indian patients with schizophrenia, particularly those treated with olanzapine and clozapine [9]. Similarly, a study conducted by Padmavati et al. in South India found a prevalence of 41.4%, reinforcing the notion that Indian psychiatric patients are at elevated risk for metabolic complications due to both medication and lifestyle factors [10].

In our study, low HDL cholesterol was the most common abnormality, seen in 50% of participants. This pattern aligns with the findings of De Leon et al., who observed HDL reduction as the most frequent lipid abnormality among schizophrenia patients on second-generation antipsychotics [11]. Furthermore, the high proportion of central obesity (waist circumference >90 cm for men, >80 cm for women) in 56.7% of the participants corroborates with Basu et al., who reported abdominal obesity in 58% of schizophrenia patients treated with SGAs in a study from Kolkata [12].

Olanzapine, the most frequently used antipsychotic in this study, was significantly associated with metabolic syndrome ($p = 0.048$). This is well-supported by the literature, including a meta-analysis by Newcomer, which demonstrated that olanzapine is among the antipsychotics with the highest liability for weight gain and metabolic disturbances [13]. Additionally, longer duration of illness (>5 years) was also significantly associated with metabolic syndrome ($p = 0.019$). This association reflects the cumulative impact of chronic illness, lifestyle changes, and prolonged exposure to psychotropic medication, as observed in the study by Malla et al., which found that chronic schizophrenia patients exhibited significantly higher metabolic abnormalities than newly diagnosed cases [14].

Although male participants in our study had a higher prevalence of metabolic syndrome (69.2% of MS cases), the association was not statistically significant ($p = 0.402$). This is in contrast to Shrivastava et al., who found a significant gender difference, with females showing a higher risk profile, possibly due to differential fat distribution and hormonal influences [15]. Overall, the findings of this study highlight a considerable burden of metabolic syndrome among schizophrenia patients on atypical antipsychotics, especially with prolonged use and drugs like olanzapine. These results support the need for routine screening, early intervention, and integration of metabolic monitoring in psychiatric care.

Conclusion

This study highlights a significant prevalence of metabolic syndrome among schizophrenia patients undergoing treatment with atypical antipsychotics, with nearly 43.3% of participants meeting the diagnostic criteria. Among the individual metabolic components, central obesity and low HDL cholesterol were most frequently observed. A statistically significant association was found between metabolic syndrome and factors such as increasing age, longer illness duration, and the use of olanzapine, underscoring the compounded risk in chronic and pharmacologically exposed populations.

The findings emphasize the critical need for regular screening and early detection of metabolic abnormalities in psychiatric practice. Integrating metabolic monitoring into routine mental health care can aid in timely intervention, thereby reducing long-term cardiovascular and diabetic complications. Additionally, patient education, lifestyle modification, and collaboration between psychiatry and internal medicine are essential to improving both psychiatric and physical health outcomes in this vulnerable population.

Future studies with larger sample sizes and longitudinal follow-up are recommended to further validate these findings and guide clinical strategies for holistic management of schizophrenia.

Limitations and Recommendations

This study was limited by its small sample size (n=30) and cross-sectional design, which restricts the ability to establish causal relationships between atypical antipsychotic use and metabolic abnormalities. Additionally, the lack of a control group and reliance on single-time biochemical measurements may limit the generalizability of findings. Future research should involve larger, multicentric samples with longitudinal follow-up to assess progression over time. It is recommended that routine metabolic screening be incorporated into psychiatric care protocols, especially for patients on long-term atypical antipsychotic therapy, along with interdepartmental collaboration for early management of emerging metabolic risks.

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