

# Antipsychotics vs. ECT with Antipsychotics: A PANSS and SCORS Investigation in Paranoid Schizophrenia

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## Abstract

**Background:** Schizophrenia is one of the most overwhelming mental illness in India, affecting about 3 million people. Paranoid schizophrenia, the most common subtype, presents significant impairments in perception, thinking, language, memory, attention, and decision-making. Atypical antipsychotics has been considered as the mainline treatment approach. Electroconvulsive Therapy (ECT) is also administered under specific circumstances. ECT combined with antipsychotics, shows promising results in symptom reduction, though its impact on severity of symptoms and cognitive functions in paranoid schizophrenia is under-studied.

**Materials and methods:** The study design was quasi experimental design. The study included 49 patients with paranoid schizophrenia at Manopchar Hospital, Raipur. Patients (18-50 years old) were divided into two groups: 21 received anti-psychotics, and 28 received both anti-psychotics and ECT. Treatment lasted 40 days, with 7 ECT sessions for the combined group. Symptom severity and cognitive functions were assessed using PANSS and SCoRS before and after treatment. Data were analyzed using descriptive statistics, Wilcoxon signed-rank test, and Hedge's g.

**Results:** Both groups showed significant symptom reduction, but the combined treatment group had greater improvements in positive symptoms (Hedge's  $g=1.19$ ). Cognitive functions improved in both groups, with the combined group showing better outcomes, especially in processing speed (Hedge's  $g=0.49$ ).

**Conclusion:** Combining ECT with anti-psychotics is more effective than anti-psychotic treatment alone, leading to better outcomes in symptom reduction and cognitive improvement in patients with paranoid schizophrenia.

**Keywords:** Paranoid schizophrenia • Anti-psychotic medication • ECT • Symptom severity • Cognition

## Introduction

Schizophrenia, a debilitating mental disorder characterized by distortions in thinking, perception, emotions, language, sense of self, and behavior, significantly contributes to the burden of disability in India. It ranks as the fourth highest contributor to Disability-Adjusted Life Years (DALYs) in the country [1]. The National Mental Health Survey of India reported a lifetime prevalence rate of 1.41% for schizophrenia [2]. There are approximately 3 million people living with schizophrenia in India, with its prevalence increasing since 1990, thereby placing an enormous strain on the healthcare system [3]. Research conducted across Central India has identified paranoid schizophrenia as the most common subtype among patients [4].

The severity of schizophrenia symptoms is a critical factor in evaluating the well-being and quality of life of patients. Cognitive domains affected include perception, memory, learning, attention, decision-making, and language abilities [5]. These impairments are often present before the onset of the disorder and persist throughout the lifespan, leading to poor functional abilities and challenges in treatment. They are crucial for understanding the psychopathology of schizophrenia and predicting outcomes in self-care, social functioning, community-living skills, and employment [6]. In paranoid schizophrenia, cognitive systems such as memory, attention, and thinking are particularly affected by disturbed working memory [7]. Despite the prevalence of paranoid schizophrenia in India, research on cognitive functioning in these patients is limited.

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Pharmacotherapy is the primary approach for treating schizophrenia, with antipsychotic drugs classified into typical (first-generation) and atypical (second-generation) antipsychotics. Atypical antipsychotics, such as clozapine, risperidone, and aripiprazole, block serotonin (5-HT) and dopamine receptors with fewer extrapyramidal side effects. Clozapine, in particular, blocks D4 receptors and avoids D2 receptor blockade, preventing extrapyramidal symptoms [8]. Risperidone is effective in treating schizophrenia and managing irritability, while aripiprazole acts as a partial D2 agonist, reducing dopamine activity by competing for D2 receptors [9].

Despite their effectiveness atypical antipsychotics have side effects, including sedation, hypotension, sexual dysfunction, cardiac arrhythmias, and cognitive impairments. They are generally preferred due to better therapeutic outcomes and fewer extrapyramidal symptoms. However, cognitive impairments remain a concern, with antipsychotics potentially developing, deteriorating, or perpetuating these deficits. Research has shown that even moderate doses of antipsychotics can impair cognitive functioning.

ECT has proven effective in treating patients with schizophrenia, especially those resistant to other treatments. A meta-analytical study confirmed ECT's efficacy in treating schizophrenia in various contexts. Combined use of ECT and antipsychotics has shown more significant improvements than ECT alone, with studies indicating reduced hospitalization rates and symptom improvements, particularly with clozapine. ECT has been associated with significant improvements in both positive and negative symptoms, with rapid improvements noted in hallucinations, formal thought disorders, and affective symptoms. Research has shown mixed results regarding cognitive performance post-ECT, with some studies reporting no differences while others indicate improved cognitive efficiency.

This study aims to evaluate the effectiveness of antipsychotic medications versus ECT on both symptom severity and cognitive functioning in paranoid schizophrenia. Despite the preference for atypical antipsychotics, ECT remains a debated treatment. Utilizing the Positive and Negative Syndrome Scale (PANSS) and the Schizophrenia Cognition Rating Scale (SCoRS), the present study seeks to address the scarcity of studies and provide insights into optimizing treatment approaches to enhance patient outcomes.

## Materials and Methods

A quasi-experimental method was adopted for this research since the patients were not randomly assigned to the treatment groups. The study aims to assess the effectiveness of antipsychotic medication alone compared to combined treatment (antipsychotic medication and Electroconvulsive Therapy (ECT)) in patients diagnosed with paranoid schizophrenia. A purposive sampling technique was used to select participants, with a total of 32 patients from the medication group and 30 patients from the combined treatment group initially evaluated before treatment. A final sample size of 23 patients in the medication group and 28 patients in the combined treatment group were evaluated post intervention.

The research was conducted at Manopchar Hospital in Raipur, Chhattisgarh, utilizing both the Outpatient Department (OPD) and the In-patient Department (IPD). Patients receiving antipsychotic medication were treated in the OPD, while those receiving combined treatment were treated in the IPD. Participants were included in the sample if they met the following criteria: They were aged between 18 to 50 years, diagnosed with paranoid schizophrenia according to ICD-10 criteria, able to read and write, and willing to provide written informed consent. Patients were excluded if they suffered from any physical illness, had comorbid disorders alongside paranoid schizophrenia, or had any neurological conditions.

The Positive and Negative Syndrome Scale (PANSS) was used to assess psychiatric symptoms and their severity. This scale consists of 30 items, each scored from 1 (absent) to 7 (severe), with total scores ranging from 30 to 210, assessing positive symptoms, negative symptoms, and general psychopathology. The scale has test-retest reliability of 0.77-0.89 for both subscale and total scores. In addition to PANSS, the Schizophrenia Cognition Rating Scale (SCoRS) was utilized to evaluate subjective cognitive impairment across eight cognitive domains. The SCoRS is a 20-item interview-based evaluation, and the interviewer provides a global rating of the participant's cognitive functioning on a 10-point scale ranging from 1 (no impairment) to 10 (extreme impairment). The SCoRS exhibited high test-retest reliability, with reliability scores of 0.90 pre-treatment and 0.80 post-treatment.

This study was conducted in accordance with ethical guidelines and received approval from the Institutional Review Board of Post Graduate Institute of Behavioral and Medical Sciences (PGIBAMS), Raipur.

## Procedure

Before starting the research work, permission from Ethical Committee of PGIBAMS, Raipur was taken. Patients meeting the inclusion criteria were initially assessed to check for the severity of symptoms through PANSS and further interviewed for assessing cognitive impairments using SCoRS (T1). Patients from the medication group were prescribed with Second Generation Antipsychotics (SGA) for a period of 40 days. Follow up was scheduled after this period. Patients from ECT with antipsychotic medication group were administered ECT every alternate day and a follow up was scheduled after 7 ECTs. In the follow up sessions the patients of both the group were then re-assessed for severity of symptoms and cognitive impairments using the same tools (T2). The collected data was then used for further statistical analysis.

## Statistical analysis

Descriptive and inferential analysis were run in the Statistical Package for Social Sciences (SPSS) software package for Mac OS, version 29.0.2.0. Descriptive analysis was computed through mean, standard deviation and Mann Whitney U test for continuous variables.

Frequency, percentage and *Chi-square* was used for nominal variables. Wilcoxon sign rank test was used for comparing the differences between pre and post treatment. Hedge's *g* test was computed to find out which treatment was more effective in reducing symptoms and improving cognitive functioning.

## Results and Discussion

Combined treatment approaches that integrate second-generation antipsychotic medication with ECT have shown promising effects in enhancing symptom control and improving overall cognitive and

functional outcomes. Considering the dearth of literature in the Indian context the current study was undertaken to bridge this gap and provide insights relevant to this particular area. In the present study the combined treatment approach has been found to be more efficient in reducing psychopathological symptoms especially positive symptoms. Improvements in cognitive functioning was observed in both combined treatment and antipsychotic medication alone with the prior proving to be more effective for improving processing/motor speed and minimally more efficient in improving other domains of cognitive functioning than the latter (Table 1).

| Baseline characteristics |               | ECT+Antipsychotic medication (N=28) |      | Antipsychotic medication (N=21) |       | U(P)         |
|--------------------------|---------------|-------------------------------------|------|---------------------------------|-------|--------------|
|                          |               | Mean                                | SD   | Mean                            | SD    |              |
| Age (Years)              |               | 30.14                               | 9.27 | 37.29                           | 12.22 | 1.97*        |
|                          |               | F                                   | %    | F                               | %     | $\chi^2$ (P) |
| Sex                      | Male          | 10                                  | 35.7 | 9                               | 42.9  | 0.25         |
|                          | Female        | 18                                  | 64.3 | 12                              | 57.1  |              |
| Religion                 | Hindu         | 28                                  | 100  | 18                              | 85.7  | 4.26         |
|                          | Others        | -                                   |      | 3                               | 14.3  |              |
| Education                | Primary       | 4                                   | 14.3 | 7                               | 33.3  | 3.82         |
|                          | Higher        | 16                                  | 57.1 | 11                              | 52.4  |              |
|                          | Graduate      | 6                                   | 21.4 | 3                               | 6.1   |              |
|                          | Post-graduate | 2                                   | 7.1  | -                               | -     |              |
| Occupation               | Employed      | 7                                   | 25   | 9                               | 32.7  | 1.81         |
|                          | Unemployed    | 8                                   | 28.6 | 4                               | 24.5  |              |
|                          | Self-employed | 13                                  | 46.4 | 8                               | 42.9  |              |
| Marital                  | Married       | 15                                  | 53.6 | 14                              | 59.2  | 1.53         |
|                          | Unmarried     | 11                                  | 39.3 | 6                               | 34.7  |              |
|                          | Separated     | 1                                   | 3.6  | 0                               | 2     |              |
|                          | Divorce       | -                                   | -    | -                               | -     |              |
|                          | Widow/Widower | 1                                   | 3.6  | 1                               | 4.1   |              |
| Residence                | Urban         | 4                                   | 14.3 | 4                               | 19    | 2.05         |
|                          | Rural         | 20                                  | 71.4 | 11                              | 52.4  |              |
|                          | Suburban      | 4                                   | 14.3 | 6                               | 28.6  |              |
| Family                   | Nuclear       | 21                                  | 75   | 20                              | 95.2  | 3.59         |
|                          | Joint         | 7                                   | 25   | 1                               | 4.8   |              |
| SES                      | Upper         | 1                                   | 3.6  | -                               | -     | 5.48         |
|                          | Middle        | 6                                   | 21.4 | 11                              | 52.4  |              |
|                          | Lower         | 21                                  | 75   | 10                              | 47.6  |              |
| Onset                    | First         | 18                                  | 64.3 | 19                              | 90.5  | 4.45*        |
|                          | Multiple      | 10                                  | 35.7 | 2                               | 9.5   |              |

Note: \*P<0.05, SES: Socio-Economic Status

**Table 1.** Sociodemographic details of patients at baseline.

In the study, 11 patients from the antipsychotic group discontinued due to side effects or perceived lack of need. Two patients from the combined treatment group dropped out due to financial issues. So, the total number of sample for the study was 49. Poor medicinal compliance, leading to relapse, was reported by family members as a primary reason for seeking alternative treatments. SGA medication, known to improve positive symptoms of paranoid schizophrenia is also confirmed through the present study (Table 2). Antipsychotic medication like risperidone and olanzapine have been known to reduce delusions and to reduce the severity of hallucinations. We observed that the symptoms did not completely alleviate in many cases but a significant difference from the baseline is observed. Antipsychotic medication is also known to calm agitation that result

from psychosis. Since persecutory delusion and commanding hallucinations are a characteristic feature of paranoid schizophrenia, alleviation of delusions and hallucination could have contributed to reduction in aggressive and excited behavior. A compared the effect of antipsychotic medication on symptom reduction between paranoid schizophrenia and disorganized behavior and it was found that patients with paranoid schizophrenia had shown a greater response and had a very signification reduction in symptom severity when severity at baseline was taken into account. Negative symptoms also showed significant improvement. A recent study has shown promising effects of second-generation antipsychotics in improving negative symptoms.

| Variables                           | Antipsychotic medication (N=21) |      |       |      | Z      |
|-------------------------------------|---------------------------------|------|-------|------|--------|
|                                     | T1                              |      | T2    |      |        |
|                                     | Mean                            | SD   | Mean  | SD   |        |
|                                     |                                 |      |       |      |        |
| Positive                            | 23.81                           | 5.03 | 13.43 | 5.42 | 4.01** |
| Negative                            | 23.24                           | 7.28 | 14.48 | 5.67 | 3.64** |
| General                             | 45.81                           | 8.94 | 31.19 | 7.58 | 3.81** |
| ECT+Antipsychotic medication (N=28) |                                 |      |       |      |        |
|                                     | T1                              |      | T2    |      | Z(P)   |
|                                     | Mean                            | SD   | Mean  | SD   |        |
| Positive                            | 26.71                           | 5.01 | 10.57 | 3.8  | 4.54** |
| Negative                            | 22.57                           | 5.7  | 11.75 | 4.26 | 4.46** |
| General                             | 43.79                           | 8.02 | 26.61 | 4.66 | 4.62** |
| Note: **P<0.01                      |                                 |      |       |      |        |

**Table 2.** Comparison of symptom severity at T1 and T2 for patients treated through antipsychotic medication and ECT with antipsychotic medication.

General psychopathology includes symptoms like anxiety, depression, guilt feeling, insight etc. A significant reduction in general symptoms through antipsychotic medication was observed. Atypical antipsychotic medications are known to be helpful in reducing a range of anxiety and depressive symptoms in schizophrenia. The present study showed improvement of insight in patients during the follow up sessions was also evident which was helpful in keeping the patient motivated for drug adherence. Uncooperativeness in patients with schizophrenia is known to be associated with insight of the patients regarding their illness.

Combination of ECT with antipsychotic medication also proved to be efficacious in reducing both positive, negative and cognitive symptoms. A study on symptom profile of patients with acute schizophrenia when treated with a combination of ECT and antipsychotic

medication showed significant improvement in hallucinations and formal thought disorder from the positive syndromes and blunted affect from the negative syndromes. The combined therapy has a greater influence in reducing positive symptoms than negative symptoms. Enhancement of Dopamine D2 receptor efficacy with the use of ECT can be one of the probable reasons for this improvement.

A significant improvement in cognitive function across all measured domains and is consistent with previous studies (Table 3). This improvement is statistically significant, indicating that the treatment had a positive impact on cognitive performance over time. A study on focusing on cognitive effects of atypical antipsychotic medication found that it was efficient in reducing cognitive deficits. Risperidone was the most efficient drug which benefited the cognitive

domains like memory, working memory, processing speed and selective attention. In the current study the drug administered to the group is inclusive to other types of atypical antipsychotic medication. The present study demonstrates that the combined treatment had a positive impact on cognitive performance over time. Combined treatment has also produced a significant improvement in memory and processing speed which is consistent with the other studies. Improvement in memory can be due to better neuronal connectivity at

hippocampus post ECT. The present study did not show any detrimental effects of ECT which is consistent with the recent findings of a meta analytical study on ECT. Deficits are however known to resolve within 3 weeks of ECT administration. Some studies have reported of no significant difference between pre-post treatments. The difference in the number of ECT sessions may have played a role in producing a significant change. ECT helps in increasing gray matter volume which reduces risk of cognitive impairments.

| Variables              | Treatment | T1    |       | T2    |      | Z (P)  |
|------------------------|-----------|-------|-------|-------|------|--------|
|                        |           | Mean  | SD    | Mean  | SD   |        |
| Memory                 | AP        | 6.95  | 2.45  | 5.24  | 1.94 | 3.10*  |
|                        | ECT+AP    | 8.11  | 2.14  | 5.89  | 1.72 | 3.99** |
| Learning               | AP        | 4.71  | 1.45  | 3.43  | 1.02 | 3.37** |
|                        | ECT+AP    | 4.89  | 2.06  | 3.68  | 1.58 | 3.36** |
| Attention              | AP        | 7.86  | 2.05  | 4.71  | 1.82 | 3.84** |
|                        | ECT+AP    | 7.96  | 1.91  | 5.25  | 1.6  | 4.29** |
| Working memory         | AP        | 4.57  | 1.56  | 3.14  | 1.27 | 3.23** |
|                        | ECT+AP    | 5.18  | 1.63  | 3.21  | 0.87 | 4.12** |
| Problem solving        | AP        | 6.62  | 2.20  | 4.19  | 1.72 | 3.59** |
|                        | ECT+AP    | 6.5   | 2.15  | 4.29  | 1.6  | 4.12** |
| Processing/Motor speed | AP        | 4.95  | 1.53  | 3.1   | 1.37 | 3.48** |
|                        | ECT+AP    | 4.11  | 1.85  | 2.64  | 0.95 | 3.37** |
| Social cognition       | AP        | 7.43  | 2.83  | 4.43  | 1.83 | 3.75** |
|                        | ECT+AP    | 7.71  | 2.99  | 4.04  | 1.07 | 4.19** |
| Language               | AP        | 2.05  | 0.97  | 1.19  | 0.4  | 3.10*  |
|                        | ECT+AP    | 1.93  | 0.9   | 1     | -    | 3.68** |
| Total                  | AP        | 44.14 | 12.49 | 29.04 | 8.77 | 3.88** |
|                        | ECT+AP    | 45.71 | 12.22 | 29.54 | 7.36 | 4.37** |

**Note:** \*P<0.05, \*\*P<0.01. AP: Antipsychotic medication

**Table 3.** Comparison of cognitive functions at T1 and T2 for patients treated through antipsychotic medication and ECT with antipsychotic medication.

The results of the present study (Table 4) have been consistent with the findings of previous studies which focused on the comparison between both treatment methods and the efficacy of ECT on patients with schizophrenia. The combined treatment has been found to have rapid response in reducing the severity of symptoms. This is an important factor to be considered since the patient's quality of life improves in a short span. Therefore, it helps the patient to get back to their routine life quickly. Our findings also indicate the combined treatment to be more efficient for positive symptoms than negative and is consistent with the previous findings. This approach is also highly beneficial for patients having a poor response to

antipsychotic medications. Moreover, improvements in cognitive functioning were observed in both treatment groups, with the combined approach demonstrating greater efficacy in enhancing processing/motor speed and overall cognitive outcomes (Table 5). These results underscore the importance of considering a holistic treatment strategy that addresses both symptom management and cognitive well-being in individuals with schizophrenia. The findings are encouraging since schizophrenia is a common and disabling condition, and any treatment that can improve both symptoms and cognitive function could have a huge impact on patients' quality of life.

| Variable | ECT+Antipsychotic medication (N=28) |       | Antipsychotic medication (N=21) |       | SD (Pooled) | Hedge's g |
|----------|-------------------------------------|-------|---------------------------------|-------|-------------|-----------|
|          | Mean                                |       | Mean                            |       |             |           |
|          | T1                                  | T2    | T1                              | T2    |             |           |
| Positive | 26.71                               | 10.57 | 23.81                           | 13.43 | 4.85        | 1.19      |
| Negative | 22.57                               | 11.57 | 23.24                           | 14.48 | 5.83        | 0.35      |
| General  | 43.79                               | 26.61 | 45.81                           | 31.19 | 7.47        | 0.34      |

**Table 4.** Effect size for symptom severity through Hedge's g test.

| Variable               | ECT+Antipsychotic medication (N=28) |       | Antipsychotic medication (N=21) |       | SD (Pooled) | Hedge's g |
|------------------------|-------------------------------------|-------|---------------------------------|-------|-------------|-----------|
|                        | Mean                                |       | Mean                            |       |             |           |
|                        | T1                                  | T2    | T1                              | T2    |             |           |
| Memory                 | 8.11                                | 5.98  | 6.95                            | 5.24  | 3.85        | 0.18      |
| Learning               | 4.89                                | 3.68  | 4.71                            | 3.43  | 2.54        | 0.03      |
| Attention              | 7.96                                | 5.25  | 7.86                            | 4.71  | 2.98        | 0.04      |
| Working memory         | 5.18                                | 3.21  | 4.57                            | 3.14  | 1.93        | 0.12      |
| Problem solving        | 6.5                                 | 4.29  | 6.62                            | 4.19  | 2.59        | -0.05     |
| Processing/Motor speed | 4.11                                | 2.64  | 4.95                            | 3.1   | 1.97        | 0.49      |
| Social cognition       | 7.71                                | 4.04  | 7.43                            | 4.43  | 2.56        | 0.14      |
| Language               | 1.93                                | 1     | 2.05                            | 1.19  | 0.79        | 0.13      |
| Total                  | 45.71                               | 29.54 | 44.14                           | 29.04 | 2.56        | 0.41      |

**Table 5.** Effect size for cognitive functions through Hedge's g test.

## Conclusion

This research is timely as it addresses a gap in understanding how ECT might help improve cognitive issues in people with paranoid schizophrenia, a topic that hasn't been explored much, especially in India. Schizophrenia is a major health issue, and cognitive problems remain even with medication. The study can help in identifying the progress in different cognitive domains through different modes of treatment which eventually would be useful in further action plans after treatment in rehabilitation and especially in therapy. The study has used statistical methods that help show whether the treatments really make a difference. The use of effect size is particularly good for understanding how big the treatment effects are, especially in cognitive improvement.

The study has few limitations like the sample size of the is only 49 which is considered to be small and in turns affects the generalizability of the results. The type and dose of antipsychotic medication prescribed to the patients were not controlled which might have affected the findings as different antipsychotic medication and its dose

has different efficacy towards schizophrenia. Maintaining equal size of the groups in further studies would help in increasing statistical power as well as reducing biases and improving generalizability. In future, research study controlling the antipsychotic medication prescribed to the patients would lead to a better understanding of its effect. A longitudinal study could be planned with increased time duration to see the lasting effects and efficacy of both the treatments. The study demonstrates that a combined treatment approach can lead to rapid recovery, which is a primary goal for patients and their families. This approach has been found effective in improving positive, negative, general, and cognitive symptoms in a short time. Furthermore, the study can help clinicians identify progress in different cognitive domains through various treatment methods, ultimately guiding subsequent rehabilitation and therapy plans.

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