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Original Article

Psychiatry/Mental Health Section

Determinants of Treatment Response in Schizophrenia: Insights from a Cross-sectional Observational Study

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ABSTRACT

Introduction: Schizophrenia is a complex mental health disorder characterised by variable treatment responses. Previous research has explored factors influencing patient experiences; however, the understanding of how modifiable and non-modifiable factors relate to treatment effectiveness remains limited and, at times, inconsistent.

Aim: To explore how the sociodemographic and clinical factors influence illness severity, treatment outcomes, and functional adjustment in work and social domains in patients with Schizophrenia.

Materials and Methods: The present cross-sectional observational study was conducted at Sree Balaji Medical College and Hospital, Chennai, India, from July 2022 to July 2023, on 74 schizophrenia patients with at least six months of follow-up. The study assessed sociodemographic factors, treatment adherence, and illness severity in relation to therapeutic outcomes and social adaptation. Data were analysed using Epi Info software version 7, applying Mann-Whitney, Chi-square, and Wilcoxon signed-rank tests, with a significance level set at $p < 0.05$.

Results: The current study included individuals diagnosed with schizophrenia spectrum disorders (mean age: 36.1 years), with balanced gender distribution. Most participants were unemployed (71.6%) and married (59.5%). A significant reduction in illness severity was observed post-intervention ($p < 0.001$). Demographic variables such as age, sex, and marital status showed no significant differences; however, marked and severe illness was associated with lower treatment efficacy ($p<0.001$) and poor resilience ($p=0.001$). Treatment response assessed via effectiveness index and global improvement categories. Treatment effectiveness was significantly associated with factors such as employment status ($p=0.028$), illness severity ($p<0.001$), age of illness onset ($p=0.021$), Higher Mental Function (HMF) ($p=0.002$), insight ($p=0.007$), resilience ($p=0.019$), and antipsychotic dose ($p=0.041$). Global improvement was significantly associated with factors such as employment status ($p=0.012$), illness severity ($p<0.001$), age of illness onset ($p=0.035$), HMF ($p=0.003$), insight ($p=0.037$), resilience ($p<0.001$), and treatment adherence ($p=0.023$). Individuals with milder illness, better insight, preserved HMF, higher resilience scores, and active treatment adherence showed more favourable outcomes. Functional impairment was significantly greater among those with inadequate treatment response and higher illness severity, particularly affecting work, home management, leisure, and interpersonal relationships ($p<0.001$). Despite overall improvement, a subset of patients continued to experience residual functional limitations, highlighting the link between treatment effectiveness and real-world functioning.

Conclusion: According to the present study results, higher resilience, good insight, employment and strong family support are the key factors associated with better outcomes. The study also supports the role of early intervention, sustained treatment engagement and a recovery oriented approach for better clinical and psychosocial care.

Keywords: Interpersonal relations, Psychotic disorders, Resilience

INTRODUCTION

Schizophrenia often stands out as one of the most persistent and debilitating mental disorders due to its complex and varied nature. This intricate psychotic disorder is characterised by a combination of positive and negative symptoms. Positive symptoms include false fixed beliefs, hallucinations, and the patient's unique experiences, and mitigating these symptoms is considered a significant milestone for both the treating physician and the individual's family. However, the true challenge emerges when addressing negative symptoms that substantially impair an individual's personal, social, and professional life [1].

Usually lying dormant until adolescence or early adulthood, Schizophrenia primarily surfaces during a person's second or third decade of life. It has even been identified as a neurodevelopmental disorder [2]. Both genetic and environmental factors, including organic causes such as traumatic brain injury, cerebrovascular accidents, and substance abuse, contribute to an individual's vulnerability to schizophrenia, with strong evidence supporting the role of genetic risk in the development of psychotic disorders [3].

Antipsychotic medications combined with rehabilitative psychotherapy remain the preferred treatment option. Although doubts about prognosis persist, antipsychotics are still considered the gold standard in treating schizophrenia. Cognitive Behaviour Therapy (CBT), family intervention, and integrated psychological treatment have been shown to improve patients' social, personal, and professional well-being [4,5]. These interventions have proven beneficial in both delaying or preventing psychosis in vulnerable individuals [6,7]. Additionally, early intervention for those who develop psychosis can positively impact the illness's progression. While it remains unclear whether antipsychotic pharmacological intervention improves response rates or long-term outcomes, studies suggest that combining psychotherapy and pharmacotherapy yields the best results [8-10].

Schizophrenia's highly varied response rates have been the subject of extensive research. These studies have sought to classify patients as

responders or non-responders, a distinction that holds potential value both prior to and during treatment. While previous findings have often been inconclusive, efforts have been directed toward categorising determinants as either modifiable or non-modifiable [11,12].

A significant portion of clinical outcome determinants lacks adaptability and precision. Non-modifiable risk factors, such as male gender, younger age of onset, poor pre-morbid adjustment, and higher baseline psychopathology scores, are associated with relatively unfavourable prospects for remission. Conversely, clinicians can influence modifiable determinants to enhance the likelihood of positive outcomes. These modifiable factors include longer duration of untreated illness, non-adherence to antipsychotics, comorbid substance use, and clozapine use in non-responders. However, the precise relationship between these determinants remains a subject of debate [13,14].

Promptly recognising a lack of response to specific antipsychotic medications early in the treatment process can prevent continued consumption of an ineffective drug, minimise adverse drug reactions and potentially reduce financial strain. In such instances, switching to a different antipsychotic might prove beneficial [15,16].

This study examined sociodemographic variables, treatment adherence and outcomes, disease severity, and the associations between determinants of therapeutic outcomes and functioning, in response to the increasing global prevalence of psychosis. Understanding these relationships will support service planning and enhance knowledge of contributing factors essential for designing effective public mental health strategies. The primary aim was to evaluate the determinants of treatment outcomes and explore their association with treatment effectiveness. Additionally, the study focuses on assessing the relationships between individual functioning, illness severity, treatment outcomes, and the interplay between treatment adherence and response.

MATERIALS AND METHODS

The present cross-sectional observational study was conducted at Sree Balaji Medical College and Hospital, Chennai, India, over a period of one year, from July 2022 to July 2023. Ethical clearance was obtained from the Institute Ethical Committee (002/SBMC/IHEC/2021/1617). Informed consent was secured from all participants or their Legally Authorised Representatives (LARs) prior to the collection of data.

Sample size calculation: A total sample size of 74 participants was typically calculated using the following formula:

$n=Z^2 \cdot p \cdot (1-p)/d^2$

Assuming:

- Z=1.96 (for 95% confidence level),
- p=0.5 [17],
- d=0.114 (precision of ±11.4%),

Substituting into the formula:

$$n=\frac{(1.96)^2*0.5*(1-0.5)}{(0.114)^2}$$

$$n=\frac{3.8416*0.5*0.5}{012996}$$

n=0.9604 / 0.012996=74

A calculated sample size of 74 was recruited for the study.

Inclusion and Exclusion criteria: The present study included patients aged 18-70 years who had been diagnosed with schizophrenia or related disorders according to the International Statistical Classification of Diseases and Related Health Problems-10th Revision (ICD-10) Classification of Mental and Behavioural Disorders: Clinical Descriptions and Diagnostic Guidelines [18], and had received treatment for at least six months. Patients were excluded if they had a diagnosis of drug or alcohol dependence (as per ICD-10), intellectual disability, a history of neurological disease, or a prior head injury.

A total of 74 eligible participants were included in the study.

Study Procedure

Comprehensive data were gathered through patient information sheets, interviews with patients and their relatives, and a thorough review of medical records.

Sociodemographic data such as sex, age of illness onset, and family history of psychiatric conditions were collected. Illness characteristics such as baseline illness severity, duration of untreated psychosis, frequency of exacerbations, presence of comorbid Axis-I disorders, past similar complaints, treatment adherence, level of insight, and medical co-morbidities were measured clinically by an expert. Insight was assessed clinically and classified as good, partial, or absent based on the patient's awareness of illness, attribution of symptoms, and acceptance of the need for treatment. Current illness severity and treatment response included a detailed analysis by interviewing the participants and their relatives, followed by a thorough review of medical records, to evaluate illness severity, overall improvement, and therapeutic response using the Clinical Global Impression scale (CGI) [19]. Patients were subsequently classified as good or inadequate responders based on an operational definition of the Clinical Global Impression-Efficacy Index (CGI-EI). A CGI-EI score of 8 or lesser were considered indicative of a good therapeutic response, whereas scores of 9 or higher were categorised as an inadequate response. This classification was established through consensus among all investigators. Functionality was assessed by using the impact of the illness on personal, social, and occupational functioning and was measured using the Work and Social Adjustment Scale (WSAS) [20], Resilience was assessed based on the ability to recover from stress and was measured using the Brief Resilience Scale (BRS) [21] and lastly the treatment Adherence was evaluated using the Clinician Rating Scale (CRS) [22,23], which follows an ordinal scoring system.

Clinical Global Impression (CGI): The CGI scale is a 3-item observer-rated scale that measures illness severity {Clinical Global Impression - Severity of Illness Scale (CGIS)}, global improvement or change {Clinical Global Impression of Change (CGIC)} and therapeutic response {Clinical Global Impression-Efficacy Index (CGIE)} [19]. The severity of illness is scored from 1 (normal) to 7 (extremely ill), while global improvement is rated from 1 (very much improved) to 7 (very much worse). Treatment response is assessed by considering both the effectiveness of the therapy and any side-effects, using a scale from 0 (marked improvement with no side-effects) to 4 (no improvement or worsening with side-effects that outweigh benefits).

The baseline severity of an illness, which encompasses how it affects an individual's personal, social, and occupational life, was gathered from caregivers, medical records, and the patient's primary psychiatrist during their initial contact. A cross-sectional examination of the severity of the illness, overall improvement since the initial consultation, and the effectiveness index revealing therapeutic effect levels and side-effects were objectively measured using the CGI Scale by the principal investigator. Our team of investigators utilised CGI therapeutic response scores to categorise patients into two distinct groups: those who demonstrated a good response and those whose response was deemed inadequate. This classification relied on a consensus derived from all the dedicated researchers involved.

Work and Social Adjustment Scale (WSAS): The WSAS is a brief self-report measure used to assess functional impairment due to a specific mental health problem. It consists of five items that evaluate the extent to which the problem affects an individual's ability to work, manage household responsibilities, engage in social and private leisure activities, and maintain close relationships. Each item is rated

on a 0 to 8 scale, where higher scores indicate greater impairment. The total score ranges from 0 to 40, with scores above 20 typically reflecting moderately severe to severe functional disruption, scores between 10 and 20 indicating significant but less severe impairment, and scores below 10 suggesting minimal or subclinical impact. The WSAS is widely used in clinical and research settings to quantify the functional consequences of mental health conditions such as depression and obsessive-compulsive disorder [20].

Brief Resilience Scale (BRS): The BRS is a six-item self-report questionnaire designed to assess an individual's ability to recover from stress and adversity. Each item is rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with some items reverse scored to control for response bias. The total score is calculated by averaging the responses, resulting in a final score between 1 and 5. Higher scores indicate greater resilience, or a stronger ability to "bounce back" from difficult situations. The BRS has been validated as a reliable tool for evaluating resilience in both clinical and non-clinical populations [21].

Clinician Rating Scale (CRS): The CRS is a clinician-administered tool used to assess a patient's adherence to prescribed treatment. It follows a 7-point ordinal scale, where each level reflects the degree of compliance, ranging from complete refusal of treatment to full, active participation. The scale measures not just if the patient takes their medication, but also their attitude and willingness to follow the doctor's advice. Higher scores indicate better adherence. This scale provides a quick and practical method to evaluate treatment engagement in clinical settings and is particularly useful in monitoring patients with chronic psychiatric conditions [22,23].

STATISTICAL ANALYSIS

Data analysis was conducted using Epi Info software. Descriptive statistics were used to present mean, standard deviation, and frequency distribution for sample characteristics. Categorical variables were analysed using Chi-square or Fischer's-exact tests. Comparisons of continuous variables were performed using Kruskal-Wallis and Mann-Whitney tests, given the non-normal distribution of variables. The Wilcoxon sign rank test was employed to assess the degree of improvement from baseline to follow-up. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The present study included participants diagnosed with schizophrenia and related disorders, ranging in age from 18 to 70 years, with a mean age of 36.1 years. The sample comprised equal proportions of males and females. Marital status distribution showed that 59.5% were married, while 40.5% were single. Regarding employment status, 28.4% were employed, whereas 71.6% were unemployed at the time of the study.

Educational attainment varied across the sample: 6.8% had no formal education; 4.1% had completed primary school; 21.6% middle school; 32.4% high school; 25.7% held a college degree; 4.1% had a diploma; and 5.4% were professionals. A positive family environment was reported by 82.4% of participants, while 17.6% experienced a negative family atmosphere.

A Wilcoxon Signed-Ranks test revealed a statistically significant reduction in illness severity scores from pre to post-intervention (Z=-7.266, p<0.001), indicating meaningful clinical improvement.

Illness Severity

The analysis revealed no significant differences in demographic variables such as age, sex, and marital status among participants. However, individuals with persistent marked or severe illness demonstrated significantly lower treatment efficacy and resilience compared to those with milder presentations (p<0.001; p=0.001) [Table/Fig-1].

Treatment Effectiveness

The distribution of demographic and clinical characteristics across treatment outcome groups, as defined by the effectiveness index, revealed several statistically significant associations [Table/Fig-2]. Employment status was strongly associated with treatment response. All employed participants (n=21; 100%) were classified as adequate responders, whereas a substantial proportion of unemployed individuals (n=11; 20.8%) fell into the inadequate responder category, indicating a significant relationship between employment and treatment outcome (p=0.028).

Severity of illness also demonstrated a robust association with treatment response. Participants with mild illness exhibited significantly better outcomes compared to those with moderate or severe presentations (p<0.001). Additionally, preservation of HMF was associated with favourable treatment response. Among adequate responders, 97.6% (n=40) had intact HMF, while only one individual (2.4%) in the inadequate responder group demonstrated such preservation (p=0.002).

Insight emerged as another critical variable influencing treatment outcomes. All participants with good (n=6; 100%) or partial insight (n=19; 100%) were classified as adequate responders. In contrast, the majority of those with poor insight (n=11; 22.4%) belonged to the inadequate responder group, with this association reaching statistical significance (p=0.007).

Although not statistically significant, a suggestive trend was observed regarding family history of psychiatric illness. Most participants without a positive family history (n=51; 89.5%) responded well to treatment, whereas a larger proportion of those with a positive family history (n=5; 29.4%) were among the inadequate responders (p=0.055), indicating a possible influence of familial predisposition on treatment outcome.

Further analysis revealed that the mean age of illness onset was significantly earlier among inadequate responders (22.73±6.97) compared to adequate responders (28.79±7.08) (p=0.021) [Table/Fig-3]. Correspondingly, the mean age at the time of study enrolment was significantly higher in the adequate responder group

Variables	NOR. (Mean±SD)	BL ILL (Mean±SD)	MIL. ILL (Mean±SD)	MOD. ILL (Mean±SD)	MAR. ILL (Mean±SD)	SEV. ILL (Mean±SD)	p-value
Age (years)	38.35±13.69	36.17±10.52	31.60±7.44	36.82±11.63	32.00±7.87	25.33±5.77	0.432
Age of onset	28.32±6.75	30.06±8.22	27.20±7.26	28.18±6.00	24.50±7.34	17.33±6.43	0.231
DOI (Months)	118.08±126.12	104.72±126.60	53.80±62.83	105.91±109.50	90.00±66.49	216.00±63.50	0.366
Exacerbations	2.65±1.74	2.33±1.53	2.60±2.07	3.45±2.34	2.83±1.17	3.67±3.06	0.742
CPZ Equivalents	246.56±104.28	282.37±143.66	178.20±116.56	352.21±405.35	636.17±447.30	286.11±209.55	0.096
Efficacy index	1.55±1.15	2.67±1.50	3.80±2.17	4.64±3.14	10.17±0.98	9.67±1.16	**<0.001***
Time to response (days)	22.23±14.12	22.17±10.56	22.60±9.61	28.82±28.32	26.00±12.60	17.33±4.93	0.800
Resilience Score	3.31±0.83	2.93±0.81	2.73±1.01	2.61±1.08	1.47±0.54	1.33±0.58	**0.001***

[Table/Fig-1]: Comparison of illness severity index based on sociodemographic and illness variables (N=74).
Note: DOI: Duration of illness; CPZ: Chlorpromazine; NOR: Normal; BL ILL: Borderline mentally ill; MIL. ILL: Mildly ill; MOD. ILL: Moderately ill; MAR. ILL: Markedly ill; SEV. ILL: Severely ill. Kruskal-Wallis Test, *p-value <0.05

Variables	Sub-category	Good response n (%)	Inadequate response n (%)	p-value
Sex	Male	29 (78.4%)	8 (21.6%)	0.190
	Female	34 (91.9%)	3 (8.1%)	
Marital status	Married	40 (90.9%)	4 (9.1%)	0.108
	Single	23 (76.7%)	7 (23.3%)	
Working status	Not Working	42 (79.2%)	11 (20.8%)	**0.028***
	Working	21 (100%)	0 (0.0%)	
Illness severity	Normal	31 (100%)	0 (0.0%)	**<0.001***
	Borderline Mentally Ill	18 (100%)	0 (0.0%)	
	Mildly Ill	5 (100%)	0 (0.0%)	
	Moderately Ill	9 (81.8%)	2 (18.2%)	
	Markedly Ill	0 (0.0%)	6 (100%)	
	Severely Ill	0 (0.0%)	3 (100%)	
HMF	Impaired	23 (69.7%)	10 (30.3%)	**0.002***
	Intact	40 (97.6%)	1 (2.4%)	
Comorbid Axis I disorder	Absent	45 (83.3%)	9 (16.7%)	0.716
	Present	18 (90.0%)	2 (10.0%)	
Past history	Absent	26 (89.7%)	3 (10.3%)	0.511
	Present	37 (82.2%)	8 (17.8%)	
Family history	Absent	51 (89.5%)	6 (10.5%)	**0.055**
	Present	12 (70.6%)	5 (29.4%)	
Family atmosphere	Negative	10 (76.9%)	3 (23.1%)	0.396
	Positive	53 (86.9%)	8 (13.1%)	
Insight	Poor	38 (77.6%)	11 (22.4%)	**0.007***
	Partial	19 (100%)	0 (0.0%)	
	Good	6 (100%)	0 (0.0%)	
Treatment adherence	Complete refusal	8 (88.9%)	1 (11.1%)	0.064
	Partial refusal	9 (69.2%)	4 (30.8%)	
	Accepts with force	3 (60.0%)	2 (40.0%)	
	Occasional reluctance	6 (85.7%)	1 (14.3%)	
	Passive acceptance	11 (84.6%)	2 (15.4%)	
	Moderate participation	6 (100%)	0 (0.0%)	
	Active participation	20 (95.2%)	1 (4.8%)	
Resilience	High	4 (100%)	0 (0.0%)	**0.019***
	Low	24 (72.7%)	9 (27.3%)	
	Normal	35 (94.6%)	2 (5.4%)	

[Table/Fig-2]: Association of effectiveness index with sociodemographic and illness variables (N=74).
Note: HMF - Higher Mental Functions.
Mann-Whitney Test, *p-value <0.05

(37.27±12.12) than among inadequate responders (29.36±6.89) (p=0.029).

Pharmacological treatment parameters also differed significantly between the groups. The mean Chlorpromazine-equivalent antipsychotic dose was notably higher among inadequate responders (502.33±389.64) than among adequate responders (264.14±192.19), suggesting that higher antipsychotic dose requirements were associated with poorer treatment outcomes (p=0.041).

Resilience, as assessed using standardised psychometric instruments, demonstrated a significant association with treatment outcomes. All individuals classified as having high resilience (n=4; 100%) were good responders, whereas a substantial proportion of participants with low resilience (n=9; 27.3%) were classified as inadequate responders (p=0.019). In line with these categorical findings, the mean resilience score was significantly higher among adequate responders (3.03±0.91) compared to inadequate responders (1.80±0.99), further supporting the predictive value of resilience in treatment response (p=0.001) [Table/Fig-3].

Variables	Good response (Mean±SD)	Inadequate response (Mean±SD)	Z-Score	p-value
Age	37.27±12.12	29.36±6.89	-2.182	**0.029***
Age of onset	28.79±7.08	22.73±6.97	-2.300	**0.021***
DOI (Months)	110.01±119.68	112.45±90.52	-0.548	0.584
Illness severity	5.51±0.64	5.73±0.47	-5.382	**<0.001***
Global improvement	1.46±0.50	3.00±0.00	-5.746	**<0.001***
Exacerbations	2.63±1.71	3.36±2.34	-0.975	0.329
CPZ equivalents	264.14±192.19	502.33±389.64	-2.047	**0.041***
Time to response (Days)	23.70±16.27	21.18±10.91	-0.304	0.761
Resilience score	3.03±0.91	1.80±0.99	-3.310	**0.001***

[Table/Fig-3]: Comparison of effectiveness index based on sociodemographic and illness variables (N=74).
Note: DOI: Duration of illness (Months), CPZ: Chlorpromazine.
Mann-Whitney Test, *p-value<0.05

Although the mean number of illness exacerbations was greater in the inadequate responder group (3.36±2.34) compared to the adequate responders (2.63±1.71), this difference did not reach statistical significance (p=0.329) [Table/Fig-3].

Global Improvement

Based on investigator consensus, all participants in the study exhibited some degree of clinical improvement and were systematically classified into one of three predefined global outcome categories: very much improved, much improved, or minimally improved. This classification ensured a consistent and comprehensive assessment of treatment response across the study population. Further analysis revealed several demographic and clinical variables significantly associated with these outcome categories [Table/Fig-4].

Employment status demonstrated a statistically significant association with global improvement. Among employed participants, 61.9% (n=13) were categorised as very much improved and 38.1% (n=8) as much improved. In contrast, the majority of unemployed individuals showed limited benefit, with 20.8% (n=11) classified as minimally improved (p=0.012).

Age at illness onset varied significantly across outcome groups. Participants in the minimally improved category had an earlier mean age of onset (22.73±6.97) compared to those in the very much improved (27.74±6.68) and much improved (30.03±7.44) groups (p=0.035) [Table/Fig-5].

Clinical severity at baseline emerged as a strong predictor of treatment response. All participants with mild illness (n=5, 100%) and the majority with moderate illness (n=9, 81.8%) showed marked improvement. Conversely, those with marked (n=6, 100%) and severe illness (n=3, 100%) were predominantly classified as minimally improved (p<0.001).

Preservation of HMF was positively correlated with treatment outcome. A significant proportion of individuals with significant improvement demonstrated intact HMF (n=23, 56.1%), whereas impaired HMF was more frequently observed among participants with minimal improvement (n=10, 30.3%) (p=0.003).

Insight also played a critical role in clinical improvement. Participants with good (n=3, 50%) or partial insight (n=11, 57.9%) demonstrated higher rates of improvement, while those with poor insight (n=11, 22.4%) were predominantly categorised as minimally improved (p=0.037).

Treatment adherence significantly influenced recovery trajectories. Participants who actively engaged in treatment (n=14, 66.7%)

Variables	Sub-category	Very much improved n (%)	Much Improved n (%)	Minimally improved n (%)	Chi-Square/ Fisher's Exact Test	p-value
Sex	Male	16 (43.2%)	13 (35.1%)	8 (21.6%)	2.701	0.259
	Female	18 (48.6%)	16 (43.2%)	3 (8.1%)		
Marital status	Married	23 (52.3%)	17 (38.6%)	4 (9.1%)	3.388	0.184
	Single	11 (36.7%)	12 (40.0%)	7 (23.3%)		
Working status	Not Working	21 (39.6%)	21 (39.6%)	11 (20.8%)	8.885	**0.012***
	Working	13 (61.9%)	8 (38.1%)	0 (0.0%)		
Illness severity	Normal	30 (96.8%)	1 (3.2%)	0 (0.0%)	57.967	**<0.001***
	Borderline Mentally Ill	4 (22.2%)	14 (77.8%)	0 (0.0%)		
	Mildly Ill	0 (0.0%)	5 (100 %)	0 (0.0%)		
	Moderately Ill	0 (0.0%)	9 (81.8%)	2 (18.2%)		
	Markedly Ill	0 (0.0%)	0 (0.0%)	6 (100%)		
	Severely Ill	0 (0.0%)	0 (0.0%)	3 (100%)		
HMF	Impaired	11 (33.3%)	12 (36.4%)	10 (30.3%)	11.733	**0.003***
	Intact	23 (56.1%)	17 (41.5%)	1 (2.4%)		
Comorbid Axis I Dis.	Absent	24 (44.4%)	21 (38.9%)	9 (16.7%)	0.539	0.764
	Present	10 (50.0%)	8 (40.0%)	2 (10.0%)		
Past History	Absent	14 (48.3%)	12 (41.4%)	3 (10.3%)	0.770	0.680
	Present	20 (44.4%)	17 (37.8%)	8 (17.8%)		
Family History	Absent	28 (49.1%)	23 (40.4%)	6 (10.5%)	3.772	0.152
	Present	6 (35.3%)	6 (35.3%)	5 (29.4%)		
Family Atmosphere	Negative	3 (23.1%)	7 (53.8%)	3 (23.1%)	3.375	0.185
	Positive	31 (50.8%)	22 (36.1%)	8 (13.1%)		
Insight	Poor	20 (40.8%)	18 (36.7%)	11 (22.4%)	10.209	**0.037***
	Partial	11 (57.9%)	8 (42.1%)	0 (0.0%)		
	Good	3 (50.0%)	3 (50.0%)	0 (0.0%)		
Treatment Adherence	Complete Refusal	5 (55.6%)	3 (33.3%)	1 (11.1%)	5.158	**0.023***
	Partial Refusal	3 (23.1%)	6 (46.2%)	4 (30.8%)		
	Compulsory Acceptance	1 (20.0%)	2 (40.0%)	2 (40.0%)		
	Occasional Reluctance	2 (28.6%)	4 (57.1%)	1 (14.3%)		
	Passive Acceptance	6 (46.2%)	5 (38.5%)	2 (15.4%)		
	Moderate Participation	3 (50.0%)	3 (50.0%)	0 (0.0%)		
	Active Participation	14 (66.7%)	6 (28.6%)	1 (4.8%)		
Resilience	High	4 (100.0%)	0 (0.0%)	0 (0.0%)	24.352	**<0.001***
	Low	6 (18.2%)	18 (54.5%)	9 (27.3%)		
	Normal	24 (64.9%)	11 (29.7%)	2 (5.4%)		

[Table/Fig-4]: Association of global improvement with sociodemographic and illness variables (N=74).
Note: HMF: Higher mental functions
Chi-square Test, *p-value <0.05

showed favourable outcomes, whereas those who refused treatment entirely (n=1, 11.1%) remained largely unimproved (p=0.023).

Resilience was a key determinant of global improvement. All individuals with high resilience scores (n=4, 100%) exhibited substantial clinical improvement. In contrast, only 18.2% (n=6) of participants with low resilience achieved comparable outcomes (p<0.001). Furthermore, the mean resilience score was significantly higher among those with robust improvement (3.34±0.83) than among those with minimal improvement (1.80±0.99) (p<0.001) [Table/Fig-5].

Functional Impairment

The present study underscores the substantial functional impact associated with higher illness severity. Patients classified with marked to severe illness exhibited significantly greater impairments in occupational functioning, home management, and participation in social and leisure activities, maintaining close relationship compared to those with mild or less severe illness (p<0.001) [Table/Fig-6].

When analysed in relation to treatment outcomes, participants categorised under the inadequate response group- based on the effectiveness index demonstrated significantly higher functional impairment across multiple domains than those who showed a good treatment response [Table/Fig-7]. These domains included reduced work productivity, difficulty in managing household responsibilities, and limited engagement in both social and private leisure activities, with all comparisons yielding high statistical significance (p<0.001). Additionally, while challenges in maintaining close interpersonal relationships were also more pronounced among those with an inadequate response, the difference was statistically less robust (p=0.001) than the impairment in other domains.

Further evaluation of variables influencing global clinical improvement revealed that, despite overall improvement in clinical status, several patients continued to experience residual functional limitations. Participants who achieved significant clinical improvement were better able to reintegrate into daily roles- effectively managing occupational and domestic tasks, engaging in leisure pursuits, and maintaining interpersonal relationships. In contrast, individuals who showed only minimal improvement displayed persistent and significant difficulties across these functional domains (p<0.001) [Table/Fig-8].

Variables	Very much improved (mean±sd)	Much improved (mean±sd)	Minimally improved (mean±sd)	H-value	P-value
Age	37.76± 13.53	36.69± 10.43	29.36± 6.89	4.762	0.092
Age of onset	27.74± 6.68	30.03± 7.44	22.73± 6.97	6.732	**0.035***
DOI (months)	118.61± 125.65	99.91± 113.64	112.45± 90.52	0.799	0.671
Illness severity	5.59± 0.61	5.41± 0.68	5.73± 0.47	2.177	0.337
Exacerbations	2.65± 1.70	2.62± 1.74	3.36± 2.34	1.008	0.604
CPZ equivalents	260.30± 107.43	268.64± 261.05	502.33± 389.64	5.468	0.065
Efficacy index	1.74± 1.33	3.07± 1.98	9.82± 0.98	37.932	**<0.001***
Time to response (Days)	22.68± 13.80	24.90± 18.94	21.18± 10.91	0.196	0.907
Resilience sore	3.34± 0.83	2.66± 0.88	1.80± 0.99	18.415	**<0.001***

[Table/Fig-5]: Comparison of global improvement based on sociodemographic and illness variables (N=74).
Note: BOP: Birth of Patient, DO: Duration of Illness (Months), DUP – Duration of Untreated Psychosis (Months), CPZ – Chlorpromazine.
Kruskal-Wallis Test, * p-value <0.05

Variables	NOR. (Mean±SD)	BL ILL (Mean±SD)	MIL. ILL (Mean±SD)	MOD. ILL (Mean±SD)	MAR. ILL (Mean±SD)	SEV. ILL (Mean±SD)	H-Value	p-value
Work impairment	2.77±2.49	3.83±2.57	3.80±1.79	5.82±1.78	7.00±1.10	7.33±1.16	24.721	**<0.001***
Home management	1.58±1.79	3.33±2.74	2.80±0.84	5.00±2.65	7.50±0.84	7.33±1.16	32.418	**<0.001***
Social and leisure activities	2.48±2.17	3.72±2.42	4.20±1.30	5.00±2.28	7.17±1.17	7.33±1.16	25.767	**<0.001***
Private leisure activities	1.71±1.97	3.06±2.78	1.80±1.10	5.18±2.27	7.17±0.75	7.33±1.16	31.368	**<0.001***
Close relationships	1.94±2.38	4.44±2.26	4.20±2.28	4.55±2.70	6.67±1.51	7.33±1.16	26.525	**<0.001***

[Table/Fig-6]: Comparison of illness severity index and WSAS (N=74).
Note: NOR.: Normal, BL ILL: Borderline Mentally Ill: MIL. ILL: Mildly Ill, MOD. ILL: Moderately Ill, MAR. ILL: Markedly Ill, SEV. ILL: Severely Ill.
Kruskal-Wallis Test, *p-value <0.05

Variables	Good response (mean±SD)	Inadequate response (mean±SD)	Z Score	p-value
Work impairment	3.60±2.56	6.82±1.33	-3.795	**<0.001***
Home management	2.76±2.51	6.45±2.51	-3.725	**<0.001***
Social and leisure activities	3.32±2.36	6.91±1.38	-4.211	**<0.001***
Private leisure activities	2.60±2.52	6.82±1.25	-4.378	**<0.001***
Close relationships	3.22±2.70	6.36±1.69	-3.447	**0.001***

[Table/Fig-7]: Comparison of effectiveness index and WSAS (N=74).
Note: Mann-Whitney Test, *p-value <0.05

Variables	Very much improved (mean±sd)	Much improved (mean±sd)	Minimally improved (mean±sd)	H-Value	p-value
Work management	2.94±2.51	4.38±2.44	6.82±1.33	18.832	**<0.001***
Home management	1.94±2.22	3.72±2.53	6.45±2.51	21.011	**<0.001***
Social and leisure activities	2.71±2.37	4.03±2.18	6.91±1.38	21.816	**<0.001***
Private leisure activities	2.00±2.30	3.31±2.63	6.82±1.25	22.818	**<0.001***
Close relationships	2.29±2.62	4.31±2.39	6.36±1.69	19.997	**<0.001***

[Table/Fig-8]: Comparison of global improvement and WSAS (N=74)
Note: Kruskal-Wallis Test, *p-value <0.05

DISCUSSION

This study examined schizophrenia and related disorders, focusing on treatment effectiveness, illness severity, resilience, and functional outcomes. The sample, with a mean age of 36.1 years and equal gender distribution, showed a significant reduction in illness severity following antipsychotic treatment. However, consistent with prior research [24,25], functional impairments persisted, especially among individuals with severe illness, frequent relapses, and unemployment.

Functional recovery extended beyond symptom relief and was influenced by multiple variables. Patients who showed greater symptom reduction also demonstrated better daily functioning, supporting the distinction between clinical remission and real-world recovery [26,27].

Participants with minimal improvement continued to experience challenges in employment, household management, and social participation, highlighting the need for comprehensive rehabilitation strategies [28].

Resilience emerged as a key factor. Participants with higher resilience scores experienced significantly better treatment outcomes and adjustment to daily stressors (p=0.001). These results align with the stress-vulnerability model, which identifies resilience as a protective factor against illness-related stress [29,30]. Studies by Marulanda S et al., and Izydorczyk B et al., have also demonstrated a strong association between resilience, stress regulation, and psychological well-being in schizophrenia [31,32]. Prior research also supports resilience as a dynamic construct that evolves through the course of illness and contributes meaningfully to psychosocial functioning [33]. Interventions that enhance resilience, such as structured psychoeducation and skill-building programs, may therefore play a critical role in facilitating recovery.

Insight into illness significantly predicted treatment outcomes (p=0.007). Patients with good or partial insight responded better to treatment, consistent with existing evidence that poor insight impairs adherence and increases relapse risk [34-37]. Medication adherence itself was significantly associated with treatment response (p=0.023), echoing findings by Birnbaum M and Sharif Z that adherence is influenced by patient attitudes and side-effect burden [38]. Ceraso A et al., have emphasised the role of sustained antipsychotic treatment in maintaining long-term symptom control [39]. These findings support interventions that improve metacognitive capacity and illness awareness [40].

Employment had a clear positive impact on treatment outcomes. All employed participants demonstrated significant improvement (p=0.028), emphasising the importance of vocational engagement in recovery. Employment contributes to self-esteem, social identity, and routine- factors strongly associated with improved psychological well-being [41-43]. These results suggest that integrating supported employment programs, such as Individual Placement and Support (IPS), into routine care can enhance long-term outcomes.

Participants without a family history of psychiatric illness tended to have better treatment outcomes (p=0.055), aligning with previous studies linking familial cases to earlier onset and prolonged untreated illness durations [44,45]. Although the association between a supportive home environment and improved outcomes was not statistically significant, likely due to sample size or variability in family involvement, the trend observed reinforces existing evidence on the importance of family support. Prior research, including work by Pharoah F et al., has shown that family-based interventions can

enhance medication adherence and positively influence clinical trajectories in schizophrenia [10].

Our findings reinforce the need for recovery-oriented care in schizophrenia that integrates psychosocial factors such as employment and family support. While antipsychotics reduced symptom severity, functional impairments remained, particularly in those with severe illness, frequent relapses, and unemployment. Better insight, higher resilience, and strong familial support were associated with improved outcomes, consistent with existing evidence. Employment emerged as a key determinant of recovery, highlighting the value of vocational rehabilitation. These results affirm that recovery extends beyond symptom control and requires a multidimensional approach- including pharmacotherapy, psychoeducation, cognitive remediation, and community-based rehabilitation- to enhance long-term functional outcomes.

Limitation(s)

While the present study offers valuable insights into treatment response in schizophrenia, certain limitations should be acknowledged. The cross-sectional design limits the ability to infer causal relationships, and the absence of a comparison group restricts the attribution of observed improvements solely to the intervention. Additionally, resilience was assessed at a single time point, which may not fully reflect its dynamic nature or account for the influence of recent psychosocial stressors. The association between employment and recovery may be influenced by unmeasured baseline differences in functioning. Furthermore, factors such as insight and resilience may be intertwined with cognitive functioning and the severity of negative symptoms, which themselves could contribute to better outcomes. These considerations highlight the need for longitudinal, controlled studies to clarify these interrelationships and strengthen causal inferences.

CONCLUSION(S)

The present study highlights the multifactorial nature of recovery in schizophrenia, emphasising that meaningful improvement extends beyond symptom reduction. Key factors associated with better outcomes included higher resilience, good insight, employment, and strong family support, while frequent relapses, early onset, and unemployment were linked to greater functional impairment. These findings reinforce the importance of early intervention, sustained treatment engagement, and a recovery-oriented approach that integrates both clinical and psychosocial care. Enhancing resilience through targeted interventions, promoting vocational rehabilitation early in treatment, and fostering supportive environments may significantly improve long-term outcomes. The results support a shift from a purely biomedical model to a personalised, biopsychosocial framework combining pharmacotherapy with cognitive, behavioral, and community-based interventions to achieve holistic recovery and improved quality of life for individuals with schizophrenia. Future research should adopt longitudinal or experimental designs to clarify the causal impact of factors such as resilience, insight, and family support on clinical and functional outcomes in schizophrenia. Repeated assessments of resilience across different illness phases such as acute episodes and remission may offer deeper insights into its dynamic role in recovery. To better isolate the unique contributions of psychosocial variables, future studies should control for potential confounders including baseline cognitive deficits, premorbid adjustment, and illness chronicity.

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