e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(4); 1281-1292

Original Research Article

Relationship between Cognitive Impairment and Caregiver Burden in Patients with Schizophrenia in Remission: A Hospital-Based Cross-Sectional Study

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Received: 01-01-2026 / Revised: 15-02-2026 / Accepted: 21-03-2026

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Conflict of interest: Nil

Abstract

Background: Schizophrenia is frequently associated with persistent cognitive impairment, and these deficits may continue even during remission, potentially increasing the burden experienced by primary caregivers.

Objectives: To assess cognitive function in patients with schizophrenia, to assess caregiver burden among primary caregivers of patients with schizophrenia, and to study the relationship between cognitive function and caregiver burden in patients with schizophrenia.

Methods: This hospital-based cross-sectional study was conducted among 84 patients with schizophrenia in remission and their 84 primary caregivers in the Department of Psychiatry of a tertiary care hospital. Patients were assessed using the PANSS remission criteria, Wisconsin Card Sorting Test, and Stroop Colour and Word Test, while caregiver burden and psychological distress were evaluated using the Burden Assessment Scale and Depression Anxiety Stress Scale.

Results: Patients had a mean age of 38.0±6.4 years, 61.9% were male, and the mean age at onset was 26.71±4.87 years. Cognitive impairment was identified in 59.5% on Stroop testing, although 53.6% had no executive dysfunction on WCST total categories completed. Mean duration of untreated psychosis was significantly higher in cognitively impaired patients than in those without impairment (8.7±3.44 vs 1.1±0.85 months; $p<0.001$). Caregivers had a mean age of 46.33±9.8 years, were predominantly female (61.9%), and most showed minimal burden (72.6%). Mean BAS score was 36.70±9.1 and correlated significantly with depression ($r=0.746$), anxiety ($r=0.720$), and stress ($r=0.705$), all $p<0.01$. Caregiver burden was significantly higher when patients had cognitive impairment ($p=0.001$).

Conclusion: Cognitive impairment was common in remitted schizophrenia and was significantly associated with greater caregiver burden, highlighting the need for early treatment, routine cognitive assessment, and family-based support interventions.

Keywords: Schizophrenia, Cognitive impairment, Caregiver burden, Remission, Executive dysfunction, Primary caregivers.

DOI: 10.25258/ijcpr.18.4.204

Introduction

Schizophrenia is a severe mental disorder with major consequences for personal, social, educational, occupational, and family functioning. The World Health Organization estimates that it affects approximately 23 million people worldwide, or about 1 in 345 persons (0.29%), with onset occurring most often in late adolescence and the twenties and tending to occur earlier in men than in women.[1] In addition to psychotic symptoms, people with schizophrenia frequently experience persistent difficulties in memory, attention, and problem-solving, and the disorder is associated with a mortality gap of about nine years compared with the general population.[2] Despite the

availability of effective treatments, only 29% of people with psychosis receive specialist mental health care globally, which highlights the continuing burden of untreated or undertreated illness and its impact on families.[3]

Cognitive impairment is now recognized as a central component of schizophrenia rather than a secondary accompaniment of psychosis alone. Keefe and Harvey emphasized that the cognitive profile of schizophrenia spans attention, learning and memory, reasoning, processing speed, and executive functioning,[4] while Kahn and Keefe argued that the traditional emphasis on psychosis has often led to under-recognition of the disorder's cognitive core.[5] More recent evidence summarized by Raffard et al. indicates that cognitive deficits are present in about 80% of individuals with schizophrenia and average approximately two standard deviations below healthy controls.[6] These impairments are clinically important because they show reliable associations with functional outcome, including community functioning, vocational performance, and interpersonal adjustment, as summarized by Green et al.[7] Remission therefore cannot be equated with full recovery: McEvoy noted that symptomatic remission and recovery are distinct constructs, with the latter requiring improvement in cognitive and psychosocial functioning as well.[8] Importantly, Krishnadas et al. reported from an Indian sample that persistent cognitive deficits were demonstrable even among patients with schizophrenia who were already in remission, supporting the need to specifically assess cognition in stabilized patients rather than assuming cognitive recovery from symptom improvement alone.[9]

The burden of schizophrenia extends beyond the patient to the primary caregiver, who in many low- and middle-income settings remains the cornerstone of long-term care. Perlick et al. showed that caring for a relative with schizophrenia is associated with high caregiver burden, depressive symptoms, poor physical health, neglect of the caregiver's own health needs, low use of social supports, and financial strain.[10] In family-based care settings, caregivers are commonly parents or spouses and often provide prolonged support; Yu et al. reported that in rural China most primary caregivers were first-degree relatives and 74.3% had been caregiving for more than 10 years.[11] Indian data also suggest that the appraisal of caregiving in schizophrenia includes both burden and other psychosocial consequences,[12] while Jagannathan et al. identified psychopathology, disability, duration of illness, caregiver education, and perceived social support as significant predictors of caregiver burden.[13] Against this background, the objectives of the study were to assess cognitive function in patients with schizophrenia, to assess caregiver burden among primary caregivers of patients with schizophrenia, and to study the relationship between cognitive function and caregiver burden in patients with schizophrenia.

Materials and Methods

This was a single-centre, hospital-based, analytical cross-sectional study conducted in the outpatient department (OPD) of the Department of Psychiatry of a tertiary care hospital over a period of 18 months (June 2022–December 2023). The study received approval from the Institutional Human Ethics Committee (IHEC) (reference number IHEC-I/1018/22 dated 27/05/2022). Each patient, along with their caregiver was provided with a Participant Information Sheet (PIS) translated into their local language. The information was also explained verbally to ensure clear understanding and voluntary agreement. The study included patients aged 18–59 years with schizophrenia diagnosed according to ICD-11 who had been in remission for at least one month and were willing to provide consent. Primary caregivers of these patients who were willing to provide consent were also included. Patients with other psychiatric illnesses, substance use, intellectual deficit, or current benzodiazepine treatment were excluded, as were caregivers with psychiatric illness. For the purpose of the study, primary caregivers were operationally defined as individuals aged 18–59 years who had been living with the patient and providing continuous physical, psychological, and financial support for at least one year.

The sample size was calculated using the single-proportion formula, $n = Z^2P(1-P)/d^2$. The calculation was based on the prevalence of cognitive dysfunction among patients with schizophrenia reported by Talreja et al. (2013).(14) Assuming an anticipated prevalence of 70%, a 95% confidence level ($Z = 1.96$), and an absolute precision of 10%, the minimum required sample size was rounded off to 84 patient-caregiver dyads; enrolled using nonprobability sampling technique – convenience/purposive sampling. After obtaining written informed consent from both patients and their primary caregivers, remission status was confirmed using the Positive and Negative Syndrome Scale (PANSS) remission criteria. PANSS assesses positive symptoms, negative symptoms, and general psychopathology. For remission assessment, eight core PANSS items were considered, and patients were included only if each of these items had a score of 3 or less and remission had been sustained for at least one month. Following confirmation of eligibility, the socio-demographic and clinical details of the patients were recorded using a semi-structured proforma.

Cognitive function in the patients was then assessed using the Wisconsin Card Sorting Test (WCST) and the Stroop Colour and Word Test (SCWT). The WCST was used to evaluate executive functioning, particularly abstract reasoning, cognitive flexibility, set shifting, and the ability to modify cognitive strategies in response to changing environmental demands. In this test, patients were required to match response cards according to sorting principles that changed without prior warning, and performance was interpreted primarily on the basis of perseverative errors, with age-based categories ranging from above average functioning to severe impairment. The Stroop Colour and Word Test was administered to assess attention, processing speed, cognitive flexibility, and the capacity to inhibit cognitive interference.

It included word, colour, and colour-word conditions, and the results were interpreted using T-scores, with scores of 40 or less considered low and scores above 40 considered normal.

After completion of the patient assessment, socio-demographic details of the primary caregivers were collected using a semi-structured proforma. Caregiver burden was assessed using the Burden Assessment Scale (BAS), a 20-item instrument that measures both subjective and objective burden among caregivers of chronically mentally ill patients.

The total BAS score ranged from 40 to 120, with higher scores indicating greater caregiver burden, and the severity was categorized as minimal, moderate, severe, or very severe. Psychological distress among caregivers was assessed using the Depression Anxiety Stress Scale-21 (DASS-21), which measured symptoms across the three domains of depression, anxiety, and stress; scores classified as normal (percentile 0–78), mild (79–87), moderate (88–95), severe (95–98), and extremely severe (≥98.1 percentile).

Statistical Analysis: Data were entered into Microsoft Excel and analysed using IBM SPSS Statistics for Windows, version 27.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the study variables; continuous variables were expressed as mean with standard deviation, median, minimum, maximum, and 95% confidence interval where appropriate, while categorical variables were presented as frequency and percentage.

Associations between categorical variables were assessed using the Chi-square test. Comparison of mean values between two groups was performed using the independent samples t-test.

Correlation between caregiver burden and depression, anxiety, and stress scores was assessed using Pearson's correlation coefficient. A two-sided p-value of less than 0.05 was considered statistically significant.

Results

Among the 84 patients with schizophrenia in remission, the mean age was 38.0±6.4 years, and 61.9% were male. Most patients had high school education (35.7%), were married (70.2%), belonged to nuclear families (72.6%), and were from semi-urban areas (52.4%). Nearly half belonged to the lower middle socioeconomic class (45.2%), and 40.5% had a family history of psychiatric illness. The mean age at onset of schizophrenia was 26.71±4.87 years, the mean total duration of illness was 135.28±60.31 months, the mean duration of untreated psychosis was 5.6±4.6 months, and the mean duration of remission in the current episode was 10.19±8.37 months. On cognitive assessment, 53.6% had no executive dysfunction based on total categories completed in the WCST, while Stroop testing showed cognitive impairment in 59.6% of patients. The mean perseverative errors score was 15.54±10.07, mean conceptual level responses were 33.76±13.26, and the mean total categories completed was 2.27±1.18.

Among the 84 primary caregivers, the mean age was 46.33±9.8 years and the mean duration of caregiving was 133.34±61.55 months. Most caregivers were female (61.9%), commonly parents (46.4%) or spouses (36.9%) of the patient, and in 56.0% of families the primary caregiver was also the main financial supporter.

High school education was the most frequent educational level (46.4%), unskilled work was the commonest occupation (39.3%), 70.2% were married, 72.6% belonged to nuclear families, and just over half were from the upper lower socioeconomic class (51.2%). The mean BAS score was 36.70±9.1, with 72.6% showing minimal burden and 27.4% moderate burden; no caregiver had severe or very severe burden. On DASS assessment, around two-thirds had normal depression, anxiety, and stress scores (65.5%, 64.3%, and 64.3%, respectively), while the mean depression, anxiety, and stress scores were 10.10±4.5, 7.38±3.38, and 13.84±5.79. BAS score showed strong positive correlations with depression ($r=0.746$), anxiety ($r=0.720$), and stress ($r=0.705$), all with $p<0.01$.

Among patients with schizophrenia in remission, cognitive impairment was present in 50 of 84 patients (59.5%). Most sociodemographic variables, including gender, education, occupation, marital status, residence, religion, and socioeconomic class, were not significantly associated with cognitive impairment (all $p>0.05$). Clinical factors such as age of onset, total duration

of schizophrenia, and duration of remission were also not significantly different between groups. However, duration of untreated psychosis was markedly higher among patients with cognitive impairment than among those without impairment (8.7±3.44 vs 1.1±0.85 months, p<0.001), indicating a strong association. With regard to caregiver burden, most caregiver sociodemographic characteristics were not significantly associated with burden status. In contrast, absence of a supporting family member was strongly associated with caregiver burden (75.0% vs 25.0%, p<0.001). Caregiver burden was also significantly more common when the patient had cognitive impairment (81.3% vs 46.2%, p=0.001). Correspondingly, caregivers of cognitively impaired patients had significantly higher burden scores than caregivers of patients without impairment (39.06±9.72 vs 33.23±6.88, p=0.003).

Table 1: Sociodemographic and illness profile of patients with schizophrenia in remission (N = 84)

Characteristic	Category/Level	n	%	Mean ± SD	Median	Min	Max	CI lower	CI upper
Patient demographic characteristics									
Age (years)				38±6.4	38	26	55	36.61	39.39
Gender	Male	52	61.9						
	Female	32	38.1						
Education	Primary	13	15.5						
	Middle school	24	28.6						
	High school	30	35.7						
	Intermediate/post high school	9	10.7						
	Graduate or post graduate	7	8.3						
Occupation	Unemployed	22	26.2						
	Unskilled worker	18	21.4						
	Semi-skilled worker	17	20.2						
	Skilled worker	11	13.1						
	Clerical/shop owner	12	14.3						
	Semi professional	3	3.6						
	Professional	1	1.2						
Marital status	Married	59	70.21						
	Separated	9	10.7						
	Unmarried	16	19						
Family type	Nuclear	61	72.6						
	Joint	23	27.4						
Residence	Rural	26	31						
	Semi urban	44	52.4						
	Urban	14	16.7						
Religion	Hindu	68	81.0						
	Christian	13	15.5						
	Muslim	3	3.6						
Socioeconomic status	Upper	0	0						
	Upper middle	3	3.6						
	Lower middle	38	45.2						
	Upper lower	24	28.6						
	Lower	19	22.6						
Family history of psychiatric illness	Present	34	40.5						
	Absent	50	59.5						
Illness characteristics									
Age of onset of schizophrenia (years)				26.71±4.87	26	17	38	25.65	27.77
Total duration of schizophrenia (months)				135.28±60.31	132	36	360	122.19	148.37
Duration of untreated psychosis				5.6±4.6	6	1	20	4.6	6.6

(months)								
Duration of remission in current episode (months)			10.19±8.37	8	1	60	8.3	12

Table 2: Cognitive assessment profile of patients with schizophrenia in remission (N = 84)

Characteristic	Category/Level	n	%	Mean ± SD	Median	Min	Max	CI lower	CI upper
WCST executive functioning categories									
Perseverative error	Mild impairment	5	6						
	Mild to moderate impairment	17	20.2						
	Moderate impairment	9	10.7						
	Moderate to severe impairment	3	3.6						
	Severe impairment	1	1.2						
	Below average	26	31						
	Average	22	26.2						
	Above average	1	1.2						
Conceptual level response	Mild impairment	12	14.3						
	Mild to moderate impairment	17	20.2						
	Moderate impairment	5	6						
	Moderate to severe impairment	3	3.6						
	Severe impairment	0	0						
	Below average	26	31						
	Average	21	25						
	Above average	0	0						
Total categories completed	Mild impairment	17	20.2						
	Mild to moderate impairment	14	16.7						
	Moderate impairment	4	4.8						
	Moderate to severe impairment	0	0						
	Severe impairment	4	4.8						
	No executive dysfunction	45	53.6						
WCST continuous parameters									
Perseverative errors				15.54±10.07	13	5	48	13.3	17.7
Conceptual level responses				33.76±13.26	36	3	52	30.88	36.64
Total categories completed				2.27±1.18	3	0	4	2.01	2.53
Stroop test parameters									
Stroop test colour score				110.11±2.6	111	99	112	109.53	110.69
Colour word score				89±12.69	91	55	112	86.24	91.75
Cognitive impairment according to Stroop test									
Cognitive impairment	Normal	34	40.5						
	Impaired	50	59.6						

Table 3: Sociodemographic and caregiving profile of primary caregivers (N = 84)

Characteristic	Category/Level	n	%	Mean ± SD	Median	Min	Max	CI lower	CI upper
Caregiver age and duration									
Age (years)				46.33±9.8	45	27	65	44.20	48.46
Duration of caregiving (months)				133.34±61.55	132	12	360	119.98	146.70
Caregiver sociodemographic characteristics									
Gender	Male	32	38.1						
	Female	52	61.9						
Relationship with patient	Parent	39	46.4						
	Spouse	31	36.9						
	Sibling	11	13.1						
	Child	0	0						
	Other	3	3.6						
Primary financial support of family	Patient	21	25.0						
	Primary caregiver	47	56.0						
	Other	16	19.0						
Education	Illiterate	6	7.1						
	Primary	15	17.9						
	Middle school	0	0						
	High school	39	46.4						
	Intermediate/post high school	21	25.0						
	Graduate or post graduate	3	3.6						
	Professional degree	0	0						
Occupation	Unemployed	6	7.1						
	Unskilled worker	33	39.3						
	Semi-skilled worker	23	27.4						
	Skilled worker	14	16.7						
	Clerical/shop owner	6	7.1						
	Semi professional	1	1.2						
	Professional	1	1.2						
Marital status	Married	59	70.2						
	Separated	18	21.4						
	Unmarried	7	8.3						
Family type	Nuclear	61	72.6						
	Joint	23	27.4						
Residence	Rural	26	31						
	Semi urban	44	52.4						
	Urban	14	16.7						
Religion	Hindu	68	81.0						
	Christian	13	15.5						
	Muslim	3	3.6						
Socioeconomic class	Upper	1	1.2						
	Upper middle	3	3.6						
	Lower middle	25	29.8						
	Upper lower	43	51.2						
	Lower	12	14.3						

Table 4: Caregiver burden and Depression-Anxiety-Stress Scale (DASS) profile (N = 84)

Characteristic	Category/Level	n	%	Mean ± SD	Median	Min	Max	CI lower	CI upper	r	p
Burden Assessment Scale (BAS)											
BAS score				36.70±9.1	32	22	52	34.72	38.67		
BAS severity											
BAS severity	Minimal	61	72.6								
	Moderate	23	27.4								
	Severe	0	0								
	Very severe	0	0								
DASS severity											
Depression	Normal	55	65.5								
	Mild	12	14.3								
	Moderate	14	16.7								
	Severe	3	3.6								
	Extremely severe	0	0								
Anxiety	Normal	54	64.3								
	Mild	13	15.5								
	Moderate	15	17.9								
	Severe	2	2.4								
	Extremely severe	0	0								
Stress	Normal	54	64.3								
	Mild	11	13.1								
	Moderate	16	19								
	Severe	3	3.6								
	Extremely severe	0	0								
DASS domain scores											
DASS depression				10.10±4.5	9	4	25	9.1	11.1		
DASS anxiety				7.38±3.38	6.5	2	18	6.6	8.1		
DASS stress				13.84±5.79	12	5	30	12.5	15.1		
Correlation between BAS and DASS domains											
DASS depression										0.746**	<0.01
DASS anxiety										0.720**	<0.01
DASS stress										0.705**	<0.01

Table 5: Sociodemographic and clinical factors associated with cognitive impairment in patients with schizophrenia remission

Variable	Category/Measure	Impairment present (n = 50)	Impairment absent (n = 34)	Test	p
Sociodemographic variables					
Gender	Male	28 (56%)	24 (70.5%)	1.80	0.131
	Female	22 (44%)	10 (29.4%)		
Education	Illiterate	1 (2%)	0 (0%)	2.03	0.916
	Primary	6 (12%)	6 (17.6%)		
	Middle school	14 (28%)	10 (29.4%)		
	High school	18 (36%)	12 (35.2%)		
	Intermediate/post high school	6 (12%)	3 (8.8%)		
	Graduate or post graduate	4 (8%)	3 (8.8%)		
	Professional degree	1 (2%)	0 (0%)		
Occupation	Unemployed	15 (30%)	7 (20.5%)	5.91	0.432
	Unskilled worker	11 (22%)	7 (20.5%)		
	Semi-skilled worker	7 (14%)	10 (29.4%)		
	Skilled worker	6 (12%)	5 (14.7%)		
	Clerical/shop owner	9 (18%)	3 (8.8%)		
	Semi professional	1 (2%)	2 (5.8%)		

	Professional	1 (2%)	0 (0%)		
Marital status	Married	31 (62%)	28 (82.3%)	4.98	0.083
	Unmarried	11 (22%)	5 (14.7%)		
	Separated	8 (16%)	1 (2.9%)		
Residence	Rural	15 (30%)	11 (32.3%)	2.59	0.273
	Semi urban	24 (48%)	20 (58.8%)		
	Urban	11 (22%)	3 (8.8%)		
Religion	Hindu	38 (76%)	30 (88.2%)	2.93	0.232
	Christian	9 (18%)	4 (11.7%)		
	Muslim	3 (6%)	0 (0%)		
Socioeconomic class	Upper	0	0	1.85	0.603
	Upper middle	1 (2%)	2 (5.8%)		
	Lower middle	21 (42%)	17 (50%)		
	Upper lower	15 (30%)	9 (26.4%)		
	Lower	13 (26%)	6 (17.6%)		
Clinical variables					
Age of onset of schizophrenia (years)		26.26±4.86	27.38±4.87	-1.04	0.303
Total duration of schizophrenia (months)		132.96±63.9	138.7±55.3	-0.43	0.671
Duration of untreated psychosis (months)		8.7±3.44	1.1±0.85	12.56	<0.001*
Duration of schizophrenia remission (months)		10.04±6.99	10.41±10.17	-0.19	0.843

Table 6: Variables associated with caregiver burden and its relationship with patient cognitive impairment

Variable	Category/Measure	Group 1	Group 2	Test	p
Panel A. Sociodemographic and clinical variables associated with caregiver burden (Group 1 = burden present; Group 2 = burden absent)					
Gender	Male	10 (31.3)	22 (42.3)	1.027	0.311
	Female	22 (68.8%)	30 (57.7%)		
Relationship with patient	Parent	13 (40.6)	26 (50.0)	1.074	0.783
	Spouse	14 (43.8)	17 (32.7)		
	Sibling	4 (12.5)	7 (13.5)		
	Other	1 (3.1)	2 (3.8)		
Primary financial support of family	Patient	8 (25.0)	13 (25.0)	0.426	0.808
	Primary caregiver	19 (59.4)	28 (53.8)		
	Other	5 (15.6)	11 (21.2)		
Education	Illiterate	1 (3.1)	5 (9.6)	8.582	0.072
	Primary	10 (31.3)	5 (9.6)		
	Secondary	13 (40.6)	26 (50.0)		
	Intermediate/post high school	6 (18.8)	15 (28.8)		
	Graduate or postgraduate	2 (6.3)	1 (1.9)		
Occupation	Unemployed	3 (9.4)	3 (5.8)	7.845	0.250
	Unskilled worker	9 (28.1)	24 (46.2)		
	Semi-skilled worker	10 (31.3)	13 (25.0)		
	Skilled worker	8 (25.0)	6 (11.5)		
	Clerical shop owner	1 (3.1)	5 (9.6)		
	Semi professional	1 (3.1)	0 (0.0)		
	Professional	0 (0.0)	1 (1.9)		
Marital status	Married	24 (75.0)	35 (67.3)	3.167	0.205
	Unmarried	4 (12.5)	3 (5.8)		
	Separated	4 (12.5)	14 (26.9)		
Residence	Rural	9 (28.1)	17 (32.7)	2.793	0.247
	Semi urban	20 (62.5)	24 (46.2)		
	Urban	3 (9.4)	11 (21.2)		
Religion	Hindu	25 (78.1)	43 (82.7)	1.090	0.580
	Christian	5 (15.6)	8 (15.4)		
	Muslim	2 (6.3)	1 (1.9)		
Socioeconomic class	Upper middle	0 (0.0)	3 (5.8)	2.466	0.482
	Lower middle	16 (50.0)	22 (42.3)		

	Upper lower	8 (25.0)	16 (30.8)		
	Lower	8 (25.0)	11 (21.2)		
Supporting family member	Yes	8 (25.0)	39 (75.0)	20.094	<0.001*
	No	24 (75.0)	13 (25.0)		
Duration of caregiving (months)		126.6 (52.8)	137.5 (66.5)	-0.779	0.438
Patient cognitive impairment	Present	26 (81.3)	24 (46.2)	10.128	0.001*
	Absent	6 (18.8)	28 (53.8)		
Panel B. Relationship between patient cognitive impairment and caregiver burden score (Group 1 = cognitive impairment present; Group 2 = cognitive impairment absent)					
Caregiver burden score		39.06±9.72	33.23±6.88	-3.014	0.003*

Discussion

The present study examined a clinically meaningful subgroup of patients with schizophrenia who were in remission, and the demographic profile of this cohort was broadly consistent with other outpatient schizophrenia samples. The mean patient age of 38.0 years, male predominance (61.9%), mean age at onset of 26.71 years, and illness duration of approximately 11 years together indicate a relatively chronic but stabilized sample rather than a first-episode cohort. This profile closely resembles the stable outpatient sample reported by Zahid et al. from Kuwait,[15] in which patients had a mean age of 36.8 years, 66.1% were men, the mean age at onset was 24.2 years, and the mean duration of illness was 12.9 years. A major finding of the present study was that cognitive impairment remained highly prevalent despite remission. On Stroop testing, 59.6% of patients showed cognitive impairment, and only 53.6% had no executive dysfunction on WCST total categories completed, indicating that remission of psychotic symptoms did not equate to normalization of higher cortical functioning. This observation is consistent with Talreja et al., who reported cognitive dysfunction in about 70% of patients with schizophrenia across attention, concentration, memory, language, and executive domains.[14] It is also in line with the study by Ji et al. in stable schizophrenia, where 66.2% of regularly treated patients still demonstrated cognitive impairment.[16] Berry et al. further showed that executive deficits, including perseverative tendencies on WCST-related tasks and Stroop abnormalities, may persist even after remission of paranoid symptoms, supporting the concept that cognitive deficits are relatively enduring features of schizophrenia rather than merely state-dependent effects of acute psychopathology.[17]

The pattern of neuropsychological performance observed in the present study is also clinically coherent. The mean perseverative errors score of 15.54, mean conceptual level responses of 33.76, and mean total categories completed of 2.27 suggest inefficiency in set shifting, abstraction, and cognitive flexibility. These domains are central to executive functioning and are classically mediated by frontostriatal and dorsolateral prefrontal circuitry. In an Indian WCST study, Singh et al. reported that patients with schizophrenia performed significantly worse than normal subjects on nearly all WCST indices, particularly perseverative measures and conceptual level responses.[18] Experimental work by Prentice et al. also showed that schizophrenia patients commit more perseverative errors and complete fewer categories because of impaired use of feedback to guide behaviour.[19] Thus, the present combination of abnormal Stroop inhibition and suboptimal WCST performance supports the interpretation that residual executive dysfunction and impaired interference control remain substantial even in remitted schizophrenia, with likely implications for day-to-day planning, adherence, judgment, and community functioning.

Interestingly, most sociodemographic variables in the present study were not significantly associated with cognitive impairment. Gender, education, occupation, marital status, residence, religion, and socioeconomic class all showed no statistically significant relationship with impaired versus unimpaired cognition. This differs from Talreja et al., who found greater dysfunction in patients with illness duration greater than two years, urban habitat, and male impairment in selected cognitive domains.[14] However, the discrepancy is not necessarily contradictory. The present study used specific executive and inhibitory control measures in a remission-defined cohort; it is therefore plausible that global sociodemographic influences may become less apparent when cognition is evaluated in a relatively homogeneous, treated, remitted sample using narrower frontal-executive tasks. In other words, the present findings support the view that cognitive dysfunction in schizophrenia may persist across social strata and may be more tightly linked to illness-process variables than to demographic descriptors. Among the clinical variables, duration of untreated psychosis (DUP) emerged as the most robust correlate of cognitive impairment, with a striking difference between cognitively impaired and unimpaired patients (8.7±3.44 vs 1.1±0.85 months, $p<0.001$). This is one of the most important findings of the study because it links later cognitive morbidity with earlier delay in treatment

engagement. Ho et al. showed in first-episode schizophrenia that untreated initial psychosis is associated with cognitive deficits and adverse brain morphological findings, raising the possibility that prolonged untreated illness may have neurobiological consequences.[20] Similarly, Lappin et al. demonstrated that longer DUP was associated with poorer verbal IQ, verbal learning, and working memory in first-episode schizophrenia.[21] More recently, Ugwuonye et al. also identified DUP as a negative predictor of neurocognitive performance in first-episode psychosis.[22] Although causality cannot be inferred from a cross-sectional design, the current findings strongly support the clinical importance of early identification and prompt treatment of psychosis to reduce the longer-term burden of cognitive dysfunction.

The caregiver findings add an equally important dimension to the present work. Primary caregivers were older than patients by roughly eight years on average, were predominantly female (61.9%), and had been involved in caregiving for a prolonged period (mean 133.34 months), underscoring the chronic family-based nature of schizophrenia care. The overall BAS profile was relatively modest, with 72.6% of caregivers showing minimal burden and 27.4% moderate burden, with no severe or very severe category. This distribution is lower than that reported in literature. For example, Hajebi et al. found that most primary caregivers had burden higher than moderate,[23] and Shamsaei et al. noted that over 90% of families experienced moderate to severe burden.[24] At the same time, the present pattern may reflect the fact that the patients in this study were in remission. Chadda et al., working with caregivers of clinically stable patients with schizophrenia, similarly emphasized that burden persists even in stable outpatient phases, although its expression may be more chronic and less crisis-driven than in relapse or inpatient settings.[25]

The strong positive correlation between BAS scores and caregiver depression, anxiety, and stress is another clinically significant observation. In the present study, BAS correlated with depression ($r=0.746$), anxiety ($r=0.720$), and stress ($r=0.705$), all at $p<0.01$, indicating that caregiver burden was not an isolated social construct but was closely tied to measurable psychological morbidity. This agrees with Fekih-Romdhane et al., who reported that after adjustment for demographic and health-related factors, caregivers' depression and stress significantly contributed to perceived burden.[26] It also accords with Opoku-Boateng et al., who found that caregivers with higher depression, anxiety, and stress had higher caregiver burden and poorer quality of life,[27] and with Dalui et al., who demonstrated that increased caregiver burden, depression, and anxiety clustered together among primary caregivers of persons with severe mental illness.[28] These convergent data suggest that caregiver screening in schizophrenia should include both burden and emotional distress rather than assuming that one can be inferred from the other. The association between caregiver burden and the family care environment was particularly notable in the present study. Absence of a supporting family member was strongly associated with caregiver burden, and this is conceptually consistent with evidence that social support is inversely related to caregiver burden. Sustrami et al. reported a significant relationship between social support and family caregiver burden in schizophrenia,[29] while Qiu et al. specifically examined social support as a mediator in the pathway linking patient disability to caregiver burden. In practical terms, this means that burden is shaped not only by the patient's illness but also by whether the caregiving role is shared or isolated within the household.[30] In the present sample, where most families were nuclear, the availability of another supportive family member may have substantially modified the subjective weight of care, even when patient illness duration and remission status were similar.

Perhaps the most important integrative finding of the study was that caregiver burden was significantly higher when the patient had cognitive impairment. Burden was present in 81.3% of caregivers of cognitively impaired patients compared with 46.2% when cognition was unimpaired, and the mean burden score was significantly higher in the cognitively impaired group (39.06 ± 9.72 vs 33.23 ± 6.88, $p=0.003$). This aligns closely with the recent study by Karahan et al., which specifically demonstrated that cognitive impairment was significantly associated with caregiver burden in stable schizophrenia.[31] It also resonates with Indian data showing that disability is a powerful determinant of caregiver burden: Kumar et al. found caregiver burden to depend on patient disability, caregiver age, and patient gender,[32] while Arun et al. reported that disability was the strongest determinant of spousal caregiver burden.[33] Since cognitive dysfunction in schizophrenia directly affects organization, social judgment, occupational capacity, and independent living, it is clinically plausible that cognition operates through disability, dependence, and supervision demands to amplify caregiver burden even during remission.

Taken together, the present findings support a treatment model in which schizophrenia care extends beyond symptom remission and systematically addresses cognition and family burden. Caregiver well-being may improve when family members receive targeted knowledge, skills, and psychoeducation. Zhou et al. showed that

better caregiving knowledge and skills were associated with lower stress, anxiety, and depression among primary family caregivers of people living with schizophrenia.[34] Interventional studies also support this approach: Iyidobi et al. found that structured psychoeducation significantly reduced caregiver burden compared with usual care,[35] and Kulhara et al. demonstrated benefits of structured psychoeducational intervention for schizophrenia in the Indian setting.[36] In this context, the present study provides a strong rationale for integrating early treatment of psychosis, cognitive assessment during remission, and family-based psychosocial interventions within routine follow-up, particularly for caregivers managing cognitively impaired patients with limited family support.

The present study had certain limitations. As it was a single-centre, hospital-based study with a relatively modest sample size, the findings may not be fully generalizable to all patients with schizophrenia and their caregivers in community or multicentric settings. The cross-sectional design limited the ability to establish causal relationships between cognitive impairment and caregiver burden. Only patients in remission were included, so the findings may not reflect the pattern seen during acute phases of illness or across the full spectrum of schizophrenia severity. In addition, factors such as medication type and dose, adherence, residual symptom severity, level of expressed emotion, and broader social support systems were not analysed in detail, although these may also influence both cognitive function and caregiver burden.

Conclusion

The present study showed that cognitive impairment remained common among patients with schizophrenia even during remission, particularly in the domains of executive function and cognitive control. A longer duration of untreated psychosis was significantly associated with cognitive impairment, highlighting the importance of early diagnosis and timely intervention. Although most caregivers experienced minimal to moderate burden, caregiver burden was strongly correlated with depression, anxiety, and stress, and was significantly higher when patients had cognitive impairment and when family support was lacking. These findings indicate that cognitive dysfunction in schizophrenia has important implications not only for patient functioning but also for caregiver well-being, emphasizing the need for comprehensive management that includes early treatment, cognitive assessment, caregiver support, and family-based interventions.

References

1. Zhan Z, Wang J, Shen T. Results of the Global Burden of Disease study for schizophrenia: trends from 1990 to 2021 and projections to 2050. Front Psychiatry. 2025; 16:1629032.
2. Correll CU, Solmi M, Croatto G, Schneider LK, Rohani-Montez SC, Fairley L, et al. Mortality in people with schizophrenia: a systematic review and meta-analysis of relative risk and aggravating or attenuating factors. World Psychiatry. 2022;21(2):248-71.
3. Burgess-Barr S, Nicholas E, Venus B, Singh N, Nethercott A, Taylor G, et al. International rates of receipt of psychological therapy for psychosis and schizophrenia: systematic review and meta-analysis. Int J Ment Health Syst. 2023;17(1):8.
4. Keefe RS, Harvey PD. Cognitive impairment in schizophrenia. Handb Exp Pharmacol. 2012(213): 11-37.
5. Kahn RS, Keefe RS. Schizophrenia is a cognitive illness: time for a change in focus. JAMA Psychiatry. 2013;70(10):1107-12.
6. Raffard S. [Cognitive functioning in schizophrenia: a lifespan perspective]. Geriatr Psychol Neuropsychiatr Vieil. 2023;21(4):477-85.
7. Green MF, Horan WP, Lee J. Nonsocial and social cognition in schizophrenia: current evidence and future directions. World Psychiatry. 2019;18(2):146-61.
8. McEvoy JP. Functional outcomes in schizophrenia. J Clin Psychiatry. 2008;69 Suppl 3:20-4.
9. Krishnadas R, Moore BP, Nayak A, Patel RR. Relationship of cognitive function in patients with schizophrenia in remission to disability: a cross-sectional study in an Indian sample. Ann Gen Psychiatry. 2007; 6:19.
10. Perlick DA, Rosenheck RA, Miklowitz DJ, Chessick C, Wolff N, Kaczynski R, et al. Prevalence and correlates of burden among caregivers of patients with bipolar disorder enrolled in the Systematic Treatment Enhancement Program for Bipolar Disorder. Bipolar Disord. 2007;9(3):262-73.
11. Yu Y, Tang BW, Liu ZW, Chen YM, Zhang XY, Xiao S. Who cares for the schizophrenia individuals in rural China - A profile of primary family caregivers. Compr Psychiatry. 2018; 84:47-53.
12. Kate N, Grover S, Kulhara P, Nehra R. Caregiving appraisal in schizophrenia: a study from India. Soc Sci Med. 2013; 98:135-40.
13. Jagannathan A, Thirthalli J, Hamza A, Nagendra HR, Gangadhar BN. Predictors of family caregiver burden in schizophrenia: Study from an in-patient tertiary care hospital in India. Asian Journal of Psychiatry. 2014; 8:94-8.

14. Talreja BT, Shah S, Kataria L. Cognitive function in schizophrenia and its association with socio-demographics factors. Ind Psychiatry J. 2013;22(1):47-53.
15. Zahid MA, Ohaeri JU, Elshazly AS, Basiouny MA, Hamoda HM, Varghese R. Correlates of quality of life in an Arab schizophrenia sample. Soc Psychiatry Psychiatr Epidemiol. 2010;45(9):875-87.
16. Ji Z, Yao F, Liu H, Zhang Y, Lei Q, Li H, et al. Cognitive impairment and its influencing factors in patients with stable schizophrenia on regular medication: a real-world clinical study. BMC Psychiatry. 2025;25(1):819.
17. Berry K, Bucci S, Kinderman P, Emsley R, Corcoran R. An investigation of attributional style, theory of mind and executive functioning in acute paranoia and remission. Psychiatry Res. 2015;226(1):84-90.
18. Singh S, Aich TK, Bhattarai R. Wisconsin Card Sorting Test performance impairment in schizophrenia: An Indian study report. Indian J Psychiatry. 2017;59(1):88-93.
19. Prentice KJ, Gold JM, Buchanan RW. The Wisconsin Card Sorting impairment in schizophrenia is evident in the first four trials. Schizophr Res. 2008;106(1):81-7.
20. Ho BC, Alicata D, Ward J, Moser DJ, O'Leary DS, Arndt S, et al. Untreated initial psychosis: relation to cognitive deficits and brain morphology in first-episode schizophrenia. Am J Psychiatry. 2003;160(1):142-8.
21. Lappin JM, Morgan KD, Morgan C, Dazzan P, Reichenberg A, Zanelli JW, et al. Duration of untreated psychosis and neuropsychological function in first episode psychosis. Schizophr Res. 2007;95(1-3):103-10.
22. Ugwuonye OK, Onu JU, Iyidobi TO, Ohaeri JU. Prevalence of neurocognitive deficits in patients with first-episode schizophrenia in an African sample and its relationship with dimensions of psychopathology and psychosocial outcome. BMC Psychiatry. 2024;24(1):866.
23. Hajebi A, Naserbakht M, Minoletti A. Burden experienced by caregivers of schizophrenia patients and its related factors. Med J Islam Repub Iran. 2019; 33:54.
24. Shamsaei F, Cheraghi F, Bashirian S. Burden on Family Caregivers Caring for Patients with Schizophrenia. Iran J Psychiatry. 2015;10(4):239-45.
25. Chadda RK, Singh TB, Ganguly KK. Caregiver burden and coping: a prospective study of relationship between burden and coping in caregivers of patients with schizophrenia and bipolar affective disorder. Soc Psychiatry Psychiatr Epidemiol. 2007;42(11):923-30.
26. Fekih-Romdhane F, Ben Ali S, Ghazouani N, Tira S, Cheour M. Burden in Tunisian Family Caregivers of Older Patients with Schizophrenia Spectrum and Bipolar Disorders; Associations with Depression, Anxiety, Stress, and Quality of Life. Clin Gerontol. 2020;43(5):545-57.
27. Opoku-Boateng YN, Kretchy IA, Aryeetey GC, Dwomoh D, Decker S, Agyemang SA, et al. Economic cost and quality of life of family caregivers of schizophrenic patients attending psychiatric hospitals in Ghana. BMC Health Serv Res. 2017;17(Suppl 2):697.
28. Dalui A, Guha P, De A, Chakraborty S, Chakraborty I. Assessment of stress & related albuminuria in caregivers of severe mentally ill persons. Indian J Med Res. 2014;139(1):174-7.
29. Sustrami D, Yusuf A, Fitryasari R, Efendi F, Aysha RF. Relationship between social support and family caregiver burden in schizophrenia patients. J Pak Med Assoc. 2023;73(Suppl 2)(2):S42-s5.
30. Qiu D, Li Y, Wu Q, An Y, Tang Z, Xiao S. Patient's disability and caregiver burden among Chinese family caregivers of individual living with schizophrenia: mediation effects of potentially harmful behavior, affiliate stigma, and social support. Schizophrenia (Heidelb). 2023;9(1):83.
31. Karahan A, Özmen ES, Arslan FC. The Effect of Psychopathology and Cognitive Functions on Caregiver Burden in Patients with Schizophrenia. Turk Psikiyatri Derg. 2025; 36:8.
32. Kumar CN, Suresha KK, Thirthalli J, Arunachala U, Gangadhar BN. Caregiver burden is associated with disability in schizophrenia: results of a study from a rural setting of south India. Int J Soc Psychiatry. 2015;61(2):157-63.
33. Arun R, Inbakamal S, Tharyan A, Premkumar PS. Spousal Caregiver Burden and Its Relation with Disability in Schizophrenia. Indian J Psychol Med. 2018;40(1):22-8.
34. Zhou Z, Wang Y, Feng P, Li T, Tebes JK, Luan R, et al. Associations of Caregiving Knowledge and Skills With Caregiver Burden, Psychological Well-Being, and Coping Styles Among Primary Family Caregivers of People Living With Schizophrenia in China. Front Psychiatry. 2021; 12:631420.
35. Iyidobi TO, Onu JU, Iteke O, Unaogu NN, Uwakwe R. The effect of structured psychoeducation on caregiver burden in carers of patients with schizophrenia in Nigeria: A 12-week follow-up investigation. S Afr J Psychiatr. 2022; 28:1703.
36. Kulhara P, Chakrabarti S, Avasthi A, Sharma A, Sharma S. Psychoeducational intervention for caregivers of Indian patients with

schizophrenia: a randomised-controlled trial. Acta Psychiatr Scand. 2009;119(6):472-83.