Original Article

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Cognitive dysfunctions in patients with bipolar disorder: A comparative study from Western Rajasthan

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Abstract

Background: Cognitive dysfunction is an established entity in bipolar disorder. The affected individuals exhibit wide-ranging deficits involving multiple domains of cognitive functioning. These deficits are associated with poor functional outcome and residual disability in patients. A substantial literature exists globally on cognition in bipolar disorder; however, few studies have been carried out on this subject in India and in Rajasthan. The aim of the study is to compare cognitive functions of bipolar disorder patients and healthy control subjects. **Subjects and Methods:** This cross-sectional study was conducted at the Psychiatry department of a tertiary care institution on 50 bipolar disorder patients and matched healthy controls subjects who fulfilled the inclusion criteria. The diagnosis was made by DSM-V criteria, and symptom severity was determined by the Young Mania Rating Scale (YMRS) and the Hamilton Depression Rating Scale (HAM-D). After seeking socio-demographic details, all participants were administered the Post Graduate Institute Battery of Brain Dysfunction (PGI-BBD) to assess cognitive functioning. Data collected were subjected to suitable statistical analysis (mean, standard deviation, and chi-square test). **Results:** The majority of the bipolar disorder patients (54%) were under 35 years of age, were males (60%), were from the urban background (70%), and were married (82%). Bipolar disorder patients performed poorly on all domains of cognitive functioning, i.e. memory, performance and verbal intelligence, and perceptuo-motor skills. **Conclusion:** The present study affirmed the previous findings of wide-spread cognitive impairment in bipolar disorder patients. Prompt diagnosis and treatment are the key steps to reduce the cognitive morbidity associated with this disorder.

Keywords: Bipolar Disorder, Cognitive Impairment, Intelligence, Memory

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Introduction

Cognition encompasses the mental functions by which knowledge is acquired, retained, and used: perception, learning, memory, and thinking.[1] Disturbances in these functions are associated with problems in general adjustment, emotional and social functioning, and well-being.[2] Cognitive psychology has now become an essential area of research in a wide variety of psychiatric disorders, ranging from severe mental illness such as schizophrenia and major mood disorders to relatively benign, non-psychotic illnesses such as psychosomatic disorders.[3]

Cognitive impairment in schizophrenia is well documented for long; however, it has been lately recognized in patients with bipolar disorder (BD). Findings of different meta-analyses confirm the presence of neurocognitive dysfunction in most patients with bipolar disorder.[4,5] These deficits affect individuals with BD both during the acute phase of illness as well as in periods of remission.[6] However, they are usually more notable during acute episodes.[7] The symptoms of the acute phase of illness clearly impact cognitive functions.[8] Patients experiencing a manic episode have deficits in verbal and working memory, executive function/reasoning, and problem-solving.[9] Cognitive deficits carry a significant functional burden and strongly predict psychosocial disability in BD patients.[10] Patients with BD exhibit cognitive difficulties, similar to those seen in patients with schizophrenia in terms of their profile, although patients with BD may have milder impairments.[11] The unaffected relatives of patients with BD also have cognitive impairments which can serve as an endophenotype for this illness.[12]

Although Indian studies have researched cognition in BD patients, they are few, and in particular, no such study has been conducted in western Rajasthan. The present study was

an attempt to add to the literature on this subject matter by evaluating different cognitive domains in detail among patients suffering from this major psychiatric disorder.

Subjects and Methods

After taking approval of the institute's Ethical committee, 50 patients of Bipolar Disorder attending the out-patient department or admitted as in-patients to Department of Psychiatry and fulfilling the inclusion criteria (patients aged between 18 years and 60 years, cooperative and able to understand simple instructions, physically as well as mentally capable of completing the questionnaire) were enrolled for the study. A healthy control group of 40 people, which were non-blood related to the patients, was included in the study. Written informed consent was taken from all the participants at the outset of study.

Socio-demographic details were elicited by self-designed proforma. The diagnosis of bipolar disorder was confirmed by a consultant psychiatrist using DSM-V diagnostic criteria. Those patients with Young's Mania Rating Scale (YRMS) score > 7[13] or Hamilton Depression Rating Scale (HAMD) score > 7,[14] were included in the study. Patients with co morbid psychiatric illness, any other current major medical/ surgical illness, and history of head injury were excluded. The Post Graduate Institute Battery of Brain Dysfunction (PGI-BBD) was administered to assess the cognitive functioning of patients and controls. PGI-BBD has been developed in India by Dwarka Pershad and Santosh K Verma.[15] The battery has been validated for use in both the Hindi-speaking and the English-speaking population. It evaluates five different domains of cognition as follows:

1. Memory: The battery contains the PGI memory scale (PMS) to assess remote and recent memory, mental balance, attention and concentration, immediate and delayed recall, verbal and visual retention, and recognition. The results of all are summed up into the PMS score.

2. Performance intelligence: It is assessed with Revised Bhatia's short battery of performance tests of intelligence, which itself consists of the Kohl-Block test and the Pass-a-Long test. The scores are summed up as performance quotient (PQ).

3. Verbal intelligence: It is evaluated by Verbal Adult Intelligence Scale (VAIS). The score is represented as the verbal quotient (VQ).

4. Perceptuo-motor-organization: Two tests were used to assess this domain, i.e., Nahor-Benson test (NBT) and Bender Visual-Motor Gestalt test (BVMGT). The perceptual behavior is regarded here as involving -"sensory reception, organization, and execution."

The dysfunction score of the above domains/sub-tests is summed up into Dysfunction Rating Score (DRS).

The information gained and the data collected were subjected to suitable statistical analysis using SPSS version 16.0 for Windows (Chicago, Illinois, USA). Frequencies with percentages were calculated for nominal and ordinal variables. Chi-square test was used to determine statistical significance (level of significance considered as $P < 0.05$) between patient and control group.

Results

The study participants included fifty bipolar disorder patients, and forty matched healthy controls. Distribution of participants from both groups across different socio-demographic variables, viz, age, gender, residence, literacy, occupations, marital status, monthly income, and the family type was comparable without any significant variance.

The majority of the patients (54%) were under 35 years of age. Sixty percent of the patients were males. Most of the patients (70%) were from the urban backgrounds. Ten percent of the patients were illiterate. Twelve percent of the patients were unemployed. Rests of the patients were engaged in different occupations, which included service, business, farming, and labor. The majority of the patients (74%) had monthly family income more than 20000 INR. Eighty-two percent of the patients were married while fifty-eight percent belonged to a joint family [Table 1].

The majority of the patients (88%) did not have a family history of the illness. Seventy-eight percent of the patients had the illness for 10 years or less duration. In eighty-four percent of the patients, age at onset of illness was 40 years or less [Table 2].

BD patients had lesser scores on the PGI memory scale (PMS), performance quotient (PQ), and verbal quotient (VQ) than the healthy control group. Patients had higher dysfunction scores on NBT and BBGT. The Dysfunction rating Score (DRS), which is the sum of all domains score, was much higher for BD group. The difference in each parameter was statistically significant ($p<0.001$) [Table 3].

Discussion

The present study was aimed to assess cognitive functions, including memory, performance, and verbal intelligence and perceptuo-motor skills in bipolar disorder patients, and to compare these with healthy control group. In addition to this, socio-demographic details and illness characteristics of bipolar disorder patients were also studied. The study was designed in a manner that both the patient group and healthy control group

Table 1: Socio-demographic characteristics ofBipolar Disorder patients (N= 50)

S. No.	Socio-demographic characteristics		Number of patients (Percentage)
1.	Age (in years)	18-25	9 (18%)
		25-35	18 (36%)
		35-45	10 (20%)
		45-60	13 (26%)
2.	Gender	Male	30 (60%)
		Female	20 (40%)
3	Residence	Rural	15 (30%)
		Urban	35 (70%)
4.	Literacy	Primary	02 (4%)
		Middle	11 (22%)
		Secondary	12 (24%)
		Higher secondary	01 (2%)
		Graduate	17 (34%)
		Postgraduate	02 (4%)
		Illiterate	05 (10%)
5.	Occupation	Service	15 (30%)
		Business	05 (10%)
		Farmer	06 (12%)
		Housewife	15 (30%)
		Labor	03 (6%)
		Unemployed	06 (12%)
		Student	0
6.	Monthly family income	< 5000	01 (2%)
		5000-10000	0
		10000-15000	02 (4%)
		15000-20000	10 (20%)
		>20000	37 (74%)
7.	Marital status	Married	41 (82%)
		Unmarried	06 (12%)
		Divorce	01 (2%)
		Separate	02 (4%)
8.	Family type	Joint	29 (58%)
		Nuclear	19 (38%)
		Alone	2 (4%)

were matched on socio-demographic variables so as to remove the confounding effect of these variables on the study findings.

The mean PMS score of BD patients indicated significant memory impairment. The findings are supported by Torrent et al. who studied cognitive dysfunction in bipolar disorder and found significant memory deficits.[16] The findings of the study conducted by Pattanayak et al. are also in line with it.[17] On the other hand, Duis' observations were contradictory to this result as he reported a specific pattern of cognitive sparing and impairment, suggesting subcortical dysfunction instead of cortical dysfunction. Although, his study was mood state-dependent, which might explain the observed difference.[18]

Performance intelligence was assessed by Revised Bhatia's Short Battery of Performance Tests of Intelligence, and scores were summed up as Performance Quotient (PQ). PQ is a measure of "Cattell's Fluid intelligence," which resides in the

Table 2: Illness characteristics among Bipolar Disorder patients (N=50)

S. No.	Illness characteristics		Number of patients (Percentage)
1	Family history	Present	06 (12%)
		Absent	44 (88%)
2	Duration of illness (years)	< 1	04 (8%)
		1-5	27 (54%)
		5-10	13 (26%)
		10-20	06 (12%)
		>20	0
3	Age of onset (years)	< 20	3 (6%)
		20-40	39 (78%)
		40-50	05 (10%)
		>50	03 (6%)
4	Course of illness	Deteriorating	06 (12%)
		Fluctuating	07 (14%)
		Improving	09 (18%)
		Episodic	21 (42%)
		Static	07 (14%)

Table 3: PGI battery of brain dysfunction (PGI-BBD) scores among Bipolar Disorder patients and control subjects

PGI-BBD scores	Bipolar Disorder patients (n=50)	Control subjects (n=40)	P -value
PGI Memory Scale (PMS) Score	64.38±12.65	83.90±6.81	< 0.001*
Performance Quotient (PQ)	94.2±16.35	133.95±15.50	< 0.001*
Verbal Quotient (VQ)	97.7±12.46	119.55±5.52	< 0.001*
Nahor-Benson Test (NBT)	1.90±1.13	0.90±0.81	< 0.001*
Bender Visual-Motor Gestalt Test (BVMGT)	10.30±5.71	3.82±2.99	< 0.001*
Dysfunction Rating Score (DRS)	19.60±8.85	2.5±0.8	< 0.001*

*Significant

non-dominant hemisphere of the brain. It was observed that the PQ of Bipolar disorder patient group is significantly lower than the healthy control group. The study by Pattanayak et al. on euthymic BD patients supported our result.[17] Joseph also observed a decline in performance, though it was statistically insignificant.[19]

Verbal quotient (VQ) indicates the "Crystallized intelligence of Cattell," which is accounted for by the dominating hemisphere of the brain. In our study, BD patients had a significantly lower VQ than controls. Pattanayak et al. in their study, included the VAIS to evaluate the cognitive profile in BD patients and reported similar significant results.[17]

Perceptuo-motor skills are commonly screened in organic dysfunctions, although these skills have also been tested in various psychiatric conditions. BD patients performed poorly both on NBT & BVMGT ($p<0.001$). The findings are supported by the comparative study by Pradhan et al., in which they found both bipolar disorder and schizophrenia patients were significantly impaired on different tests of executive function, memory, IQ, and perceptuomotor functions.[11]

Not much of the data is available explicitly comparing BD patients and healthy controls on the scale PGI-BBD. In

this comparative study, the tests of neurocognitive functions chosen were based on the findings of earlier studies on patients with BD. As both the study groups were matched on socio-demographic variables, it can be inferred that the difference seen between the patient group and the control group cannot be ascribed to any of these variables. The results of the present study suggest BD patients have impairment on a wide range of neurocognitive functions. These results should be interpreted in the background of the following limitation: the sample size may be regarded as small, and hence generalization of our findings cannot be done to all types of patients.

Conclusion

The present study affirmed the presence of significant cognitive dysfunctions in bipolar disorder patients, notably in domains of memory, performance, and verbal intelligence and perceptual-motor skills. Cognitive assessment should be incorporated in the routine examination of these patients. Prompt diagnosis and active treatment with medications and novel cognitive rehabilitation strategies could potentially reduce the cognitive morbidity associated with this disorder.

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