



Chronic Schizophrenia - Cognitive Dysfunction

KEYWORDS

Cognitive dysfunction, schizophrenia

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ABSTRACT *Background: Deficits in neurocognitive function are a hallmark of schizophrenia. They are associated with clinical manifestations and the course of the illness. A study of cognitive dysfunction in Indian patients with schizophrenia is of significance in view of a more benign course and outcome of the illness in this region.*

Aim: To study cognitive deficits in patients with chronic schizophrenia and compare them with those in the normal population.

Methods: We compared 100 patients with chronic schizophrenia with 100 matched normal controls on multiple measures of attention, executive function and memory.

Results: Compared to normal individuals, patients with schizophrenia performed poorly in all cognitive tests.

Conclusion: The neurocognitive profile of Indian patients with chronic schizophrenia resembles those of patients in developed countries.

Introduction

Schizophrenia is accompanied by impairments in several domains of cognitive function.¹ Patients with schizophrenia have been found to perform more poorly than normal controls on tasks of attention, memory, executive function, language, learning and motor control.²⁻⁴ In recent times, cognitive impairment has gained importance in terms of emerging theories on the aetiology and treatment of schizophrenia.⁵ Cognitive impairment in schizophrenia has been found to be related to measures of psychopathology^{6,7} and outcome.^{8,9} Much research on cognition in schizophrenia has been done in developed countries where the outcome was found to be poorer than that in developing countries such as India. It is of interest to know the degree and nature of cognitive dysfunction in Indian patients with schizophrenia. Studies in India have described cognitive deficits in schizophrenia.^{10,11} We compared cognitive deficits in patients with chronic schizophrenia with those of a matched normal population.

Methods

The case group was a consecutive sample selected from outpatients attending ASRAM Hospital, Eluru and comprised 100 subjects (men: 60; women: 40) fulfilling the DSM-IV criteria for chronic schizophrenia. A clinical interview and chart review established the diagnosis. All of them were on antipsychotic drug treatment at the time of evaluation. Subjects between the ages of 18 and 45 years, with at least 10 years of school education, were selected. The control group comprised 100 healthy subjects (men: 60; women: 40) with no current, past or family history of any psychiatric disorder. They were selected from among volunteers by the stratified sampling method and matched with subjects from the study group for age, sex and education. All participants gave a written informed consent after being explained the nature of the study. The cases and controls did not differ significantly in their mean age (33.6 years, SD±8.2 vs 33.9 years, SD±8.1; $t=0.251$) and years of formal education

14.3 years, SD±3.1 vs 13.9 years, SD±2.8; $t=0.893$). The patients were ill for a mean duration of 10.4 years (SD±6.8). The neuropsychological tests done are listed in Table 1.¹²⁻¹⁶

Cognitive dysfunction in chronic schizophrenia

Test done (subtests)	Function measured
Digit Span Test ¹² (forward and backward)	Span of attention (verbal task)
Visual Memory Span ¹² (forward and backward)	Span of attention (non-verbal task)
Digit Symbol Substitution Test ¹³	Sustained attention and speed
Visual Number Scanning Ability Test* (time taken, number/minute)	Visual scanning and attention
Ideational Fluency Test* Ruff Figural Fluency Test ¹⁴ (unique and perseverative responses)	Executive function—verbal fluency Executive function—non-verbal fluency
Wisconsin Card Sorting Test ¹⁵ Letter-Number Span test ¹⁶ (correct and longest)	Executive functions and cognitive flexibility Working memory
Delayed Response Learning Test*	Working memory
Verbal Learning and Memory* (immediate, delayed recall)	Logical memory and learning
Visual Learning and Memory* (immediate, delayed recall)	Immediate visual memory
Verbal Paired Associate Learning Test ¹² (immediate, delayed recall)	Associate learning (verbal)
Visual Paired Associate Learning Test ¹² (immediate, delayed recall)	Associate learning (visual)
Visual Reproduction Test ¹² (immediate, delayed recall)	Immediate and delayed visual memory

Data analysis

The Statistical Package for Social Sciences (SPSS)¹⁷ was used for data analysis. The chi-square and t tests were applied for univariate analysis. Simple correlation and partial correlation analyses were done to measure the relationship between continuous variables. The variables significant at univariate analysis were entered into classification analysis using the Mahalanobi distant statistic method to identify neuro- psychological tests that differentiated normals from patients.

RESULTS

The mean scores on the Positive and Negative Syndrome Scale (PANSS)¹⁸ were 10.2 (SD±3.9) for the positive subscale (PS), 9.6 (SD±3.2) for the negative subscale (NS) and 23.6 (SD±5.7) for the general psychopathology subscale (GS).

Cognitive deficits

The patients performed significantly poorer than normal subjects on all tests of cognitive functions evaluated— attention, executive function, memory—except the number of perseverative responses on the Ruff Figural Fluency test for executive function, and immediate recall on the Visual Reproduction task of memory (Table 2).

The step-wise, discriminant function analysis identified 10 tests measuring tasks of attention, executive function and memory which differentiated most between patients and normal controls. The minimum D squared statistic and standardized canonical discriminant function coefficients (SCDFC) of the tests are listed in Table 3. A classification analysis based on the SCDFC of these 10 variables classified 92% of the study population appropriately into their original groups as patients and normal subjects.

DISCUSSION

Cognitive deficits in chronic schizophrenia We did not have any difficulty in using the neuropsychological tests developed in other cultures. The significant level of schooling of patients during which English was one of main languages taught seemed to facilitate their ability to understand and perform on tests that had numerate or verba tasks. We feel cultural factors had little impact on performance in the neuropsychological tests.

Patients with schizophrenia performed poorly on all tests of cognitive function compared with the normal population matched with respect to gender, age and education. The classification analysis showed that patients with schizophrenia

Table 2. Comparison of the cognitive functions in patients with schizophrenia and normal controls

Neuropsychological test	Normal subjects		t value
	Mean±SD	Mean±SD	
Attention			
Visual Scanning—time taken	10.7±7.9	16.3±9.0	7.10*
Visual Scanning—number/minute	22.2±2.4	17.0±4.0	11.1**
Digit Span—forward	15.7±1.1	9.6±1.0	6.88**
Digit Span—backward	8.0±1.0	7.2±1.0	9.29**
Visual Memory Span—forward	10.0±1.0	9.2±1.0	7.08**
Visual Memory Span—backward	8.3±1.0	7.4±1.0	7.29**
Digit Symbol Substitution Test	27.0±1.0	41.0±1.0	10.19**
Executive function			
Wisconsin Card Sorting Test			
Perseverative responses	10.1±1.0	1.0±0.7	7.34**
Total errors	10.1±1.0	10.1±1.0	2.49**
Total non-perseverative errors	10.1±1.0	10.1±1.0	1.81**
Concepts achieved	1.0±0.5	1.0±0.2	0.11*
Mean of perseverative responses	1.0±0.1	1.0±0.1	2.49**
Non-perseverative responses	1.0±1.0	0.1±0.1	6.09**
Non-perseverative responses/total	1.0±1.0	0.1±0.1	6.09**
Conceptual level responses/total	1.0±1.0	1.0±1.0	1.08*
Perseverative responses/total	1.0±1.0	1.0±1.0	1.08*
Other test			
Reproduction Memory	1.0±1.0	1.0±1.0	0.72**
Ruff Figural Fluency—perseverative	1.0±1.0	1.0±1.0	0.88 (NS)

Visual Paired Association—delayed	10.0±1.0	10.0±1.0	0.00*
Visual Paired Association—immediate	10.0±1.0	10.0±1.0	0.00 (NS)
Visual Paired Association—delayed	10.0±1.0	10.0±1.0	0.00**
Visual Learning and Memory—delayed	10.0±1.0	10.0±1.0	0.00**
Visual Learning and Memory—immediate	10.0±1.0	10.0±1.0	1.08*
Letter Fluency—Spoken—immediate	10.0±1.0	10.0±1.0	0.00**
Letter Fluency—Spoken—delayed	10.0±1.0	10.0±1.0	0.00**
Ruff Figural Fluency—unique responses	10.0±1.0	10.0±1.0	0.00**
Memory			
Visual Paired Association—delayed	10.0±1.0	10.0±1.0	0.00**
Visual Paired Association—immediate	10.0±1.0	10.0±1.0	0.00**
Visual Learning and Memory—delayed	10.0±1.0	10.0±1.0	0.00**
Visual Learning and Memory—immediate	10.0±1.0	10.0±1.0	0.00**

*p<0.01, which is significant

NS: not significant

can often be clearly differentiated from the normal population based on their performance on some of the tests of attention, executive function and memory.

Table 3. Function analysis of patients with schizophrenia and normal controls (standardized canonical discriminant function coefficient)

Neuropsychological test	Patients with schizophrenia		Normal subjects
	Mean	SD	
Attention			
Visual Scanning—time taken	6.593	0.319	
Visual Scanning—number/minute	2.585	0.509	
Digital Span—backward recall	5.214	0.220	
Digit Symbol Substitution Test	6.333	0.341	
Executive function			
Wisconsin Card Sorting Test			
Failure to maintain set	4.545	-0.359	
Other tests			
Ideational Fluency	3.766	0.391	
Ruff Figural Fluency—unique responses	5.538	0.278	
Memory			
Verbal Paired Association—delayed	5.754	0.248	
Verbal Learning and Memory—delayed	6.876	0.228	
Visual Learning and Memory—delayed	6.007	-0.324	

We observed that negative symptoms had a strong association with cognitive dysfunction in all the domains. This finding is in agreement with the results of studies which showed that both positive and negative symptoms were associated with distinct neuropsychological deficits.²⁵ Heydebrand et al.²⁶ observed that negative symptoms were related more frequently to cognitive dysfunction than positive symptoms.

CONCLUSION

In a group of patients with chronic schizophrenia in India, the nature and degree of cognitive deficits are comparable with observations made in developed countries. It would be of interest to explore the relationship between cognitive deficits in, and outcome of, schizophrenia among Indian patients, as they have a better outcome than patients with schizophrenia in developed countries.

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