

Received: 14.06.2016
Accepted: 22.12.2016

A – Study Design
B – Data Collection
C – Statistical Analysis
D – Data Interpretation
E – Manuscript Preparation
F – Literature Search
G – Funds Collection

DOI:10.5604/17307503.1227056

VISUO-SPATIAL ABILITY AND MEMORY OF CHRONIC SCHIZOPHRENIA PATIENTS ENGAGED IN PRODUCTIVE WORK

Tulika Ghosh^{1(A,B,C,D,E,F)}, Minkesh Chowdury^{2(A,B,C,D,E,F)},
Masroor Jahan^{1(A,B,C,D,E,F)}, Amool R.Singh^{1(A,B,C,D,E,F)}

¹ Department of Clinical Psychology, Ranchi Institute of Neuro-Psychiatry and Allied Sciences, Street- Kanke, Ranchi, Jharkhand, India.

² Department of Clinical Psychology, Institute of Mental Health and Hospital, Mathura Road, Bilochpura, Agra, Uttar Pradesh, India.

SUMMARY

Background:

Previous studies give sufficient evidence that memory impairment is one of the most profound cognitive deficits in schizophrenia. The aim of the research paper was to assess the effect of the functional status on the visuo-spatial ability and memory of chronic schizophrenic patients. The hypothesis of this study was that there will be no significant differences in the daily living skills and visuo-spatial ability and memory of chronic schizophrenic patients engaged and not engaged in some productive work.

Material/ Methods:

Sixty chronic schizophrenic patients engaged and not engaged in any productive work from Ranchi Institute of Neuro-Psychiatry and Allied Sciences (RINPAS), Ranchi, India were administered the Rey Complex Figure Test and Recognition Trial and analyzed using SPSS.

Results:

Results revealed that 90% of patients had impairment in copy trial, 86.66% patients had a severe level of impairment in immediate recall, delayed recall and recognition among the chronic schizophrenic patients not engaged in any productive work.

Conclusions:

The findings suggest that the functional status of the chronic schizophrenic patients affects their visuo-spatial ability and memory which can be used as a measure to treat and rehabilitate chronic schizophrenic patients.

Keywords: abilities of daily living, immediate recall and delayed recall

INTRODUCTION

Memory emerges as one of the principal foci of interest in studies of cognitive impairments in schizophrenia. Visuo-spatial ability is linked to the capability of taking a correct estimate of distances, volumes and areas. Basically it implies the fineness in the estimation of all such proportions and how they are scattered in space. This group of cognitive functions analyzes and understands space (i.e., the world around you) in two and three dimensions. Memory deficits in learning and retaining new information following a delay have consistently been demonstrated on a wide range of tasks including the Wechsler Memory Scale and its revisions (e.g. Wechsler, 1997), the Rey Auditory Verbal Learning Test (Strauss & Spreen, 1990), California Verbal Learning Test (Delis et al. 1987) and Rey Complex Figure Test (Rey, 1941). They include mental imagery and navigation, distance and depth perception, and visuo-spatial construction.

Studies suggest that on average men have better visuo-spatial skills than women; in fact, men and women do not use exactly the same parts of their brains to solve problems requiring 3D image rotation or mental navigation in a virtual environment. Visual-spatial impairments are often among the first symptoms noted in Alzheimer's disease and can be manifested by individuals getting lost in familiar environments, forgetting where they placed their personal items, or difficulty driving or parking a car.

To assess visual memory disturbance in different forms of schizophrenia, Silverstein et al. (1998) compared the Rey-Osterrieth Complex Figure Test (RCF) performance in acutely psychotic, chronically psychotic, and outpatient schizophrenia patients and in a control group of acutely psychotic patients with disorders other than schizophrenia. There were no group differences on the copy condition of the RCF. The chronic schizophrenia group utilized more abnormal copying strategies, however, than the outpatient or non-schizophrenia groups. Moreover, the chronic schizophrenia group demonstrated significantly poorer recall than the outpatient or non-schizophrenia groups, and a trend toward poorer performance than the acute schizophrenia group. Both groups of inpatient schizophrenia patients were characterized by a lack of relationship between copying strategies and recall accuracy.

Verbal declarative memory deficits in schizophrenia are well documented whereas visual declarative memory is less studied. Moreover, there are limited data on whether organizational and visual memory deficits are specific to schizophrenic psychoses. Seidman et al. (2003) compared visual memory and organizational function in patients with chronic schizophrenia (n=79) and chronic bipolar psychotic disorder (n=14), and in healthy controls (n=84) using the Rey-Osterrieth Complex Figure (ROCF), testing whether organizational impairments (i.e., executive dysfunctions) account for the visual memory deficit. Groups were comparable on age, handedness and expected intellectual ability (based on single word reading).

Using analyses of covariance with sex, parental SES and ethnicity as co-variables, patients with schizophrenia were significantly more impaired than controls

on copy accuracy, on recall accuracy, and on the percent accuracy of recall. Patients with schizophrenia used a more detail-oriented style on copy and recall and had a significantly worse recognition memory. After co-varying IQ, copy organization was also significantly different between the groups. Results for accuracy of copy and recall were not significantly attenuated when controlling for copy organization. The duration of illness was associated with visual memory. Bipolar patients performed at an intermediate level between controls and patients with schizophrenia.

The purpose behind this study was also that there is a dearth of Indian as well as Western studies in this intent. Keeping these facts and findings in mind, this study was conducted with the aim of seeing the impact of the functional status of chronic schizophrenic patients upon their visuo-spatial memory and visuo-spatial ability as well.

OBJECTIVES

To assess and compare the basic living skills of the chronic schizophrenic patients engaged and not engaged in productive work.

To assess and compare the visuo-spatial ability and visuo-spatial memory among the chronic schizophrenic patients engaged and not engaged in productive work.

HYPOTHESES OF THE STUDY

There will be no significant difference in the daily living skills of chronic schizophrenic patients engaged and not engaged in some productive work.

There will be no significant difference in visuo-spatial ability and visuo-spatial memory among the chronic schizophrenic patients engaged and not engaged in some productive work.

MATERIAL AND METHOD

Material

Based on a purposive sampling technique, the participants were selected. The sample for this study consisted of sixty patients suffering from chronic schizophrenia drawn from various wards of the Ranchi Institute of Neuro-Psychiatry and Allied Sciences, Kanke as per ICD-10 DCR criteria in the age range of 21 to 40 years, male sex, who gave informed consent to participate in the study, were cooperative, were able to comprehend the test instructions properly, having an illness duration of two years or more were selected for this study among whom thirty patients were engaged in productive work and thirty patients were not engaged in any productive work in their respective wards. The patients with significant co-morbid neurological conditions, with violent behavior or having severe positive or negative symptoms, with a past history of memory impairment, with

psychopathology interfering in test administration, with vision, hearing and drawing difficulties were excluded from the study.

Measures: socio-demographic and clinical data sheet

It was a semi-structured and self-prepared proforma, which contains information about socio-demographic variables like name, age, sex, education, marital status, employment status, socio-economic condition, religion etc and clinical details like duration, mode of onset, course and progress of illness of the sample that was included in the study.

Checklist for basic living skills

A self-prepared checklist for assessing the basic living skills of the sample included in this study was used. In this checklist, various components were included like toileting skills, brushing teeth, bathing, hair-care, nail care, eating habits and house-keeping. This checklist was also used to determine the functionality and non-functionality of the included sample.

Rey complex figure test and recognition trial

The Rey-Osterrieth Complex Figure Test (ROCF) is a neuropsychological assessment in which examinees are asked to reproduce a complicated line drawing, first by copying and then from memory. It was first proposed by the Swiss psychologist André Rey in 1941 and further standardized by Paul-Alexandre Osterrieth in 1944. It is frequently used to elucidate any secondary effect of brain injury in neurological patients, to test for the presence of dementia, or to study the degree of cognitive development in children. The inter-rater reliability coefficient of this test is ranged from 0.93- 0.99 with a median inter-rater reliability coefficient of 0.94.

Procedure

Initially, an informed consent was taken from all the participants and they had also explained to them the purpose of the study. The Rey Complex Figure Test and Recognition Trial was administered and scored following standard procedure.

Statistical analysis

The obtained responses of functional and non-functional chronic schizophrenic patients on Rey Complex Figure Test and Recognition Trial were analyzed by using a chi-square test with the help of Statistical Package of Social Sciences (SPSS).

RESULTS

The present research study assessed the visuo-spatial ability and visuo-spatial memory of functional and non-functional chronic schizophrenic patients using the "Rey Complex Figure Test and Recognition Trial".

The socio-demographic characteristics of the functional and non-functional group of the patients taken up for the study are given in Table 1. A chi-square test was applied to compare the socio-demographic variables and no significant difference was found for all the variables in both the functional and non-functional group of schizophrenic patients.

Table 2 shows the comparison of the clinical details of the patients group using the chi-square test. No significant difference was found among both the functional and non-functional group for all the variables except for the duration of illness, which was significant at 0.05 level.

Table 1. Comparing socio-demographic variables for patients engaged and not engaged in productive work

Variables		Group		x ² (df)
		Patients engaged in productive work (N%)	Patients not engaged in productive work (N%)	
Age	20-30	09 (30)	07(23.33)	.341 (1)
	30-40	21(70)	23(76.66)	
Education	Up to matric	22(73.33)	20(66.66)	.988 (2)
	Matric to graduation	05(16.66)	08(26.66)	
	Higher	03(10)	02(6.66)	
Occupation	Unemployed	21(70)	23(76.66)	.624 (3)
	Employed	03 (10)	02(6.66)	
	Self-Work	06(20)	05(16.66)	
Marital status	Single	13(43.33)	14(46.66)	.067 (1)
	Married	17(56.66)	16(53.33)	
SES	Lower	18(60)	22(73.33)	3.459 (2)
	Middle	09(30)	08(26.66)	
	Upper	03(10)	00	
Domicile	Rural	16(53.33)	22(73.33)	2.584 (1)
	Urban	14(46.66)	08(26.66)	
Religion	Hindu	25(83.33)	25(83.33)	.476 (2)
	Muslim	03(30)	04(13.33)	
	Christian	02(6.66)	01(3.33)	

Table 2. Comparing the clinical details of patients engaged and not engaged in productive work

Variables		Patients engaged in productive work (N%)	Patients not engaged in productive works(N%)	x ² (df)
Mode of onset	Abrupt	1(3.33)	0	1.405 (2)
	Acute	2(6.66)	1(3.33)	
	Insidious	27(90)	29(96.66)	
Course of illness	Continuous	25(83.33)	29(96.66)	2.963(1)
	Episodic	5(16.66)	1(3.33)	
Progress of illness	Static	1(3.33)	0	1.686(3)
	Fluctuating	2(6.66)	4(13.33)	
	Improving	1(3.33)	1(3.33)	
	Deteriorating	26(86.66)	25(83.33)	
Duration	2-3 years	12(40)	8(26.66)	10.050(3)
	3-4 years	9(30)	3(10)	
	4-5 years	6(20)	6(20)	
	More than 5 years	3(10)	13(43.33)	

Basic living skills of both the functional and non-functional group of schizophrenic patients were compared using the chi-square test (Table 3). A significant difference was found in all the variables among which the difference in toileting was significant at 0.01 level and the difference in bathing, hair-care, nail-care, eating habits and housekeeping habits was significant at 0.001 level.

Levels of impairment in visuo-spatial constructional ability, visuo-spatial memory and recognition ability of the patients who were engaged in productive work like arranging the beds, washing utensils, bringing food from the kitchen etc and those who were not able to do any kind of productive work on the different variables of the Rey Complex Figure Test and Recognition Trial is shown in Table 4. Impairment in the copy trial was found in 56.66% of patients engaged in productive activities whereas 90% of patients had impairment in the copy trial who were not engaged in any productive activity. Here a significant difference was found between both the functional and non-functional group and the difference was found to be significant at a level of 0.01.

40% of patients engaged in productive activity had a severe level of impairment whereas 86.66% of patients not engaged in any productive activity had a severe level of impairment in immediate recall. A mild level of impairment was

Table 3. Comparing the basic living skills of patients engaged and not engaged in productive activity

Variables		Patients engaged in productive work (N%)	Patients not engaged in productive work (N%)	X ² (df)
Toileting	Normal	8(26.66)	0	12.232 (3)
	Mild	16(53.33)	15(50)	
	Moderate	6(20)	14(46.66)	
	Severe	0	1(3.33)	
Bathing	Normal	14	0	40.522 (3)
	Mild	16 (53.33)	7(23.33)	
	Moderate	0	7(23.33)	
	Severe	0	16(53.33)	
Hair-care	Normal	5(16.66)	0	13.604 (3)
	Mild	17(56.66)	9(30)	
	Moderate	8(26.66)	20(66.66)	
	Severe	0	1(3.33)	
Nail-care	Normal	6(20)	0	46.286 (3)
	Mild	24(80)	4(13.33)	
	Moderate	0	13(43.33)	
	Severe	0	13(43.33)	
Eating habits	Normal	30(100)	11(36.66)	27.805 (1)
	Mild	0	19(63.33)	
	Moderate	0	0	
	Severe	0	0	
Housekeeping	Normal	10(33.33)	1(3.33)	33.506 (2)
	Mild	20(66.66)	8(26.66)	
	Moderate	0	21(70)	
	Severe	0	0	

Table 4. Comparing impairment scores in visuospatial constructional ability, visuospatial memory and recognition ability

Variables		Patients engaged in productive work (N%)	Patients not engaged in productive work (N%)	X ² (df)
Copy Trial impairment	Absent	13(43.33)	3 (10)	8,523 (1)
	Present	17 (56.66)	27 (90)	
Immediate recall impairment	Above average	0	1(3.33)	21,491 (6)
	Average	6(20)	0	
	Below average	5(16.66)	0	
	Mild	1(3.33)	2(6.66)	
	Mild to moderate	3(10)	1(3.33)	
	Moderate	3(10)	0	
	Severe	12(40)	26(86.66)	
Delayed Recall Impairment	Above average	0	1(3.33)	13,570 (5)
	Average	4(13.33)	0	
	Mild	2(6.66)	1(3.33)	
	Mild to moderate	5(16.66)	2(6.66)	
	Moderate	4(13.33)	0	
	Severe	15(50)	26(86.66)	
Recognition Impairment	Below average	1(3.33)	0	10,618 (4)
	Mild	3(10)	0	
	Mild to moderate	5(16.66)	1(3.33)	
	Moderate	6(20)	3(10)	
	Moderate to severe	15(50)	26(86.66)	

found in 20% of patients engaged in productive activity and in 6.66% of patients not engaged in productive activity. A moderate level of impairment was found in 20% of patients engaged in productive activity and in 3.33% of patients not engaged in any productive work. In immediate recall, a difference was found between both the functional and non-functional group and the difference was found to be significant at a level of 0.01.

In delayed recall, 6.66% of patients engaged in productive work and 3.33% of patients not engaged in any productive work had a mild level of impairment, 30% of patients engaged in productive work and 6.66% of patients not engaged in productive work had a moderate level of impairment, 50% of patients engaged in productive work and 86.66% of patients not engaged in productive work had a severe level of impairment in delayed recall. The difference was found to be significant at a level of 0.05.

In the next variable, “recognition”, 13.33% of patients engaged in productive work had a mild level of impairment, 36.66% of patients engaged in productive work and 13.33% of patients not engaged in any productive work had a moderate level of impairment, 50% of patients engaged in productive work and 86.66 % of patients not engaged in any productive work had a severe level of impairment in

the recognition trial. The difference between the functional and non-functional group in the recognition trial was found to be significant at a level of 0.01.

DISCUSSION

The important finding of the present study is that patients with chronic schizophrenia who are not engaged in productive work as a whole group perform statistically lower in RCFT and Recognition trial in comparison to the chronic schizophrenic patients engaged in some work. The results reveal a significant level of deficit in visuo-spatial ability and visuo-spatial memory in the chronic schizophrenic group not engaged in productive work in comparison to the chronic schizophrenic patients engaged in productive work. This finding is consistent with the findings of Cermak et al. (1992) and Krishnadas et al. (2007).

The patients not engaged in any productive activity made more mistakes in copying the RCFT figure but in the immediate recall trial, their performance improved and it was found that they were able to recall the figure more correctly. This implies that their visual memory skills are better in comparison to their visuo-spatial constructional skills. In the delayed recall trial, it was found that the performance of the patients not engaged in any productive work was nearly the same as their performance in immediate recall trial which suggests less impairment in their right hemispheric function. Research has indicated that individuals with schizophrenia exhibit a deficit in encoding or processing information presented in right hemi-space; this deficit is often referred to as right hemi-spatial inattention (Brugger & Graves, 1997). For example, Wigat et al. (1997) reported that un-medicated schizophrenia patients showed a lateralized abnormality in reaction time in a cueing paradigm; similar findings have been reported by others (Carter et al. 1992). Such findings support the notion that schizophrenia patients' display left hemispheric dysfunction.

In comparison to the patients engaged in some productive activity, the level of impairment of the patients not engaged in any productive work was significantly more indicating that their visual memory skills, visuo-spatial constructional skills are more impaired in comparison to the patients engaged in productive work and their right hemispheric impairment is also more. In recognition, it was found that patients who are engaged in some productive work are able to recognize the different units of the RCFT figure more accurately in comparison to the patients not engaged in productive work. This implies that the patients who are engaged in some work are able to remember the information received from the environment more accurately and are also able to use them more accurately according to their need in comparison to the patients not engaged in any productive work.

The results of this study support the existence of visuo-spatial memory deficits in patients with schizophrenia and are consistent with studies which have investigated the memory function in the same group of patients, although it is difficult to directly compare the results to other studies in the literature, given that RCFT

has not been used previously for the investigation of visuo-spatial memory deficits in patients with schizophrenia using their daily functioning as the criteria. As a conclusion, it can be said that when chronic schizophrenic patients are kept engaged in any sort of activity whether it be in the hospital set up or at home, their visuo-spatial ability and visuo-spatial memory will certainly improve with time in comparison to that time when they were not doing any work.

Future suggestions

This study may be repeated with larger samples, with patients suffering from other major psychiatric disorders like affective disorders, substance abuse disorders and most importantly, females suffering from chronic schizophrenia may be also included in the study.

CONCLUSION

Thus it can be said that the functional status of the chronic schizophrenic patients affects their visuo-spatial ability and memory. So, this needs to be seen from our side that we as clinicians, should try to motivate the individuals having chronic schizophrenia to do some work so that the degree of impairment in their visuo-spatial ability and memory decreases to some extent.

REFERENCES

- Brugger, P., & Graves, R.E. (1997). Right hemi-spatial inattention and magical ideation. *European Archives of Psychiatry and Clinical Neurosciences*, 247, 55-57.
- Carter, C.S., Robertson, L.C., Chaderjian, M.R., Celaya, L.J., & Nordahl, T.E. (1992). Attentional asymmetry in schizophrenia: controlled and automatic processes. *Biological Psychiatry*, 31, 909-918.
- Cermak, S., Eimon, M., Eimon, P., & Hartwell, A. (1992). Constructional abilities in persons with chronic schizophrenia. *Occupational Therapy in Mental Health*, 11(4), 21-39.
- Delis, D.C., Kramer, J.H., Kaplan, E., & Ober, B. (1987). California Verbal Learning Test: Manual. San Antonio: Harcourt Brace Jovanovich.
- Krishnadas, R., Moore, B.P., Nayak, A., & Patel, R.R. (2007). Relationship of cognitive function in patients with schizophrenia in remission to disability: a cross-sectional study in an Indian sample. *Annals of General Psychiatry*, 6, 19.
- Meyers, J.E., & Meyers, K.R. (1941). Rey Complex Figure Test and Recognition Trial: Professional Manual. PAR, Inc.
- Osterrieth, P.A. (1944). "Filetest de copie d'une figure complex: Contribution a l'etude de la perception et de la memoire [The test of copying a complex figure: a contribution to the study of perception and memory]". *Archives de Psychologie*, 30, 286-356.
- Rey, A. (1941). "L'examen psychologique dans les cas d'encephalopathie traumatique (Les problems)". *Archives de Psychologie*, 28, 215-285.
- Seidman, L.J., Lanca, M., Kremen, W.S., Faraone, S.V., & Tsuang, M.T. (2003). Organizational and visual memory deficits in schizophrenia and bipolar psychoses using the Rey-Osterrieth Complex figure: effects of duration of illness. *Journal of Clinical Experimental Neuropsychology*, 25(7), 949-964.
- Silverstein, S.M., Osborn, L.M., & Palumbo, D.R. (1998). Rey-Osterrieth Complex Figure Test performance in acute, chronic, and remitted schizophrenia patients. *Journal of Clinical Psychology*, 54(7), 985-994.

- Strauss, E., & Spreen, O. (1990). A comparison of the Rey and Taylor figures. *Archives of Clinical Neuropsychology*, 5, 417-420.
- Wechsler, D. (1997). Wechsler Memory Scale. San Antonio, TX: Harcourt Assessment.
- Wigat, S.B., Swanson, J.M., & Potkin, S.G. (1997). Lateralized attentional deficits in drug-free and medicated schizophrenic patients. *Neuropsychologia*, 35(12), 1519-1525.

Address for correspondence:

Tulika Ghosh
Department of Clinical Psychology,
Ranchi Institute of Neuro-Psychiatry and Allied Sciences,
Street- Kanke, Ranchi,
834006 Jharkhand, India.
E-mail: itstulika@yahoo.com