A Prospective Study of Assessment of Cognitive Dysfunctions in Patients with Schizophrenia

Edam Ravinder[1], Naga Chaitanya Duggirala[2]

[1]Associate Professor, Department of Psychiatry, Nimra institute of Medical sciences, Jupudi (V), Ibrahimpatnam (M), NTR Dist., Andhra Pradesh, India
[2]Assistant Professor, Department of Psychiatry, Nimra institute of Medical sciences, Jupudi (V), Ibrahimpatnam (M), NTR Dist., Andhra Pradesh, India

Abstract:
The aim of the study is to analyze the cognitive dysfunctions in patients with depression. A case control study was undertaken in 50 Schizophrenia Patients taken as Cases and 50 participants of Healthy volunteers as controls. Socio-demographic details collected from both the cases and controls. Cases diagnosed as schizophrenia according to ICD-10. Cognitive tests of Standardized mini mental status examination (SMMSE), Brief cognitive rating scale, Digit symbol substitution test, Trail making tests A & B, were assessed. No significant difference between the cases and controls with respect to socio-demographic variables. Majority of the study group belong to urban areas than rural, married more than singles and belonging to nuclear family. Cases poorly performed on SMMSE than controls with statistically significant difference. Cases when compared to controls had statistically significant impairment in all the five axis of Brief Cognitive Rating Scale. Cases acquired more time in performing the Trail Making Test, both A and B, and more errors while performing the task when compared to controls. Study concludes that comparison of sociodemographic profile with SMMSE, Digit symbol substitution test (DSST), Trail making tests A & B and BCRS showed that Cognitive deficits are more in males, people from urban areas ,educated upto primary/middle school, unemployed. Comparison of duration of illness with SMMSE, DSST, Trail making tests A & B and BCRS showed that as duration of illness increases the cognitive deficits increases.

Keywords: Schizophrenia, cognitive dysfunction, standardized mini mental status examination, Trail making tests.

Introduction

Schizophrenia affects approximately 24 million people worldwide and it is one of the top 20 leading contributors to years lost to disability globally. [1,2] Schizophrenia is diagnosed 1.4 x times more frequently in males than females, and typically appears earlier in men- the peak ages of onset are 20 to 28 years for males and 26–32 years for females. [3]

Cognition is defined as the mental processes of perception, memory, and information processing, which allows the individual to acquire knowledge, solve problems, and plan for the future. It comprises the mental processes required for everyday living and should not be confused with intelligence. [4]

Cognitive functioning in schizophrenia has been recognized since Kraepelin who first described schizophrenia as dementia praecox. Intelluctual impairements and abnormalities in attention and volition played a prominent role in Kraeplin's and Bleuler's original clinical accounts of schizophrenia. Since the 1980s, cognitive impairement has come to be seen as a core feature of the disorder, reliably present in the majority of patients, independent of such positive symptoms as delusions and hallucinations, and a majorcause of poor social and vocational outcome. [5] Current thinking about schizophrenia acknowledges that the illness is fundamentally a disease of the brain. Deficit in cognition is one of the manifestations of the neuropathology of the illness. [6] Early detection and effective management of cognitive dysfunction will have better outcome and improves quality of life. Hence the present study aims to investigate Cognitive Dysfunctions among the Schizophrenia patients.

Materials & Methods

A Case control study on participants selected from

those attending the outpatient clinic of the department of psychiatry, Nimra institute of medical sciences, Andhra Pradesh. Data has been collected from February to September 2023.

50 patients who were diagnosed as schizophrenia according to ICD-10 along with 50 controls of healthy volunteers who are willing to participate in the study were selected as controls. Purposive sampling was done to include the individuals.

Inclusion criteria includes adults age more than 18 years of both genders, diagnosed as schizophrenia according to ICD10 and individuals who are willing to give consent to participated in the study. Individuals any history of neurodegenerative disorders, history of seizures, diagnosed with any other psychiatric disorder, Patients with history of head injuries associated with unconsciousness, pregnant were excluded.

Data collection: Patients diagnosed as schizophre-

nia by ICD-10 in psychiatry OPD. 50 controls were participated in the study by using General health questionnaire and who scores < 23.

The cognitive functions of both cases and controls were assessed using Standardized mini mental status examination (SMMSE), Brief Cognitive Rating Scales (BCRS), Digit Symbol Substitution Test (DSST), Trial Making Test - A and Trail Making Test – B. Further they are compared among cases and with to that of controls.

Data collected in the Excel sheet and statistical analysis done by using SPSS Version 22.0. To test association between the groups chi-square test was implied. A p value < 0.05 is considered as statistically significant. Mann- Whitney test was used to test mean difference between groups. Spearman's rank correlation was used to test the correlation between the scores.

Results

Table 1: Demographics of study population

Socio-demographics	Cases n (%)	Controls n (%)	P value
Age group			
21 – 30 years	40	34	0.4
31 – 40 years	38	42	
41 – 50 years	18	12	
>50 years	4	12	
Sex			
Male	70	65	0.8
Female	30	35	
Residence			
Rural	30	44	0.2
Urban	70	56	
Marital status			
Single	44	36	0.9
Married	50	52	
Separated	2	8	
Divorced	4	4	
Family type			
Nuclear	58	70	0.4
Joint	40	26	
Extended nuclear	2	4	
Education			
Primary school	54	44	0.1
Middle school	30	36	
High school	10	10	
Post high school/ intermediate	2	4	
Graduate & higher	4	6	
Occupation			
Unemployed	16	8	0.7
Unskilled worker	42	56	
Semi-skilled worker	26	18	
Skilled worker	6	6	
Clerical / Shop owner/farmer	6	6	
Semi profession	2	4	
Profession	2	2	
Family Income			

≤ 1865	18	18	0.4
1866 – 5546	22	38	
5547 – 9248	34	22	
9249 - 13873	22	18	
13874 – 18497	2	2	
18498 – 36996	0	2	
≥ 36997	2	0	

Table 2: Distribution of the study groups according to SMMSE score, BCRS, DSST scores, TMT _ A & TMT_ A Errors, TMT _ B & TMT _ B Errors.

		Cases	Controls	P value
SMMSE		21.32 ± 3.8	28.2 ± 1.1	< 0.0001
BCRS	Axis – 1	1.65 ± 0.68	1.2 ± 0.4	< 0.0001
	Axis – 2	1.62 ± 0.6	1.14 ± 0.5	< 0.0001
	Axis – 3	2.59 ± 0.8	1.1 ±0.2	< 0.0001
	Axis – 4	1.2±0.42	1.2± 0.2	0.035
	Axis – 5	2.45 ±1.25	1.18 ± 0.42	< 0.0001
DSST		69.5 ±18.5	95.8 ± 7.8	< 0.0001
TMT _ A errors		35.75 ± 14.8	20.9 ± 5.5	< 0.0001
		1.75 ± 1.32	0.44 ± 0.59	< 0.0001
TMT _B errors		114.4 ± 59.5	58.5 ± 21.5	< 0.0001
		4.59 ± 3.85	1.5 ± 0.89	< 0.0001

Table 3: Comparisons of Duration of illness with SMMSE, DSST, BCRS,TMT-A, TMT-A errors, TMT-B and TMT-B errors

Tests	Duration of illness			P value
	< 3 years Mean (±SD)	3 – 5 years Mean (±SD)	> 5 years Mean (±SD)	
SMMSE	22.9 ± 4.6	18.5 ± 2.7	19.5 ± 1.6	< 0.0001
DSST	78.9 ± 17.5	64.5 ± 15.8	60.8 ±14.2	0.004
TMT- A	31.9 ±16.5	39.5 ± 15.2	37.5 ± 9.5	0.38
TMT- A errors	1.5 ± 1.5	2.15 ± 1.2	2.6 ± 0.5	0.12
TMT- B	95.2 ± 76.9	58.25 ± 52.9	72.6 ± 72.7	0.35
TMT-B errors	3.4 ± 3.5	5.59 ± 3.58	6.55 ± 4.65	0.12
BCRS-Axis – 1	1.7 ± 0.75	2.3 ± 0.6	2.2 ±0.7	0.006
BCRS-Axis – 2	1.55± 0.62	1.89 ±0.8	1.65±0.89	0.048
BCRS-Axis – 3	2.5± 0.89	2.75± 0.6	3.2+ 0.8	0.05
BCRS-Axis – 4	1.15 ± 0.4	1.15 ± 0.4	1.3 + 0.5	0.69
BCRS-Axis – 5	1.90± 1.1	3.1 ± 1.4	2.4 ±0.6	0.01

Discussion

The present study's demographic results were similar to the previous studies in relation to Mean age of the study group. [7,8,9] Males outnumbered females in the present study. In the present study, distribution of cases according to their residence, urban was slightly more than rural. The present study results were similar to the previous studies in relationto Domicile distribution in the study group. [7,9] This is in contrast to our results. The present study revealed that about 50% of the cases and 52% of the controls were married. About 44 % of the cases and 36% controls were single, 4% of the cases and 4% of the controls were Divorced. There was no statistically significant difference between the cases and controls. The present study results were similar to the previous studies in relation to marital status. [7,9] In the present study, among the cases, 58% of the subjects belonged to nuclear family and 40% of the study subjects were from joint family. No statistically significant difference between the cases and controls. Majority of the study group belong to Nuclear family.

In the present study, about 54% of the cases and 44% of the controls were educated up to primary school, graduate and higher education in 4% of test and 6% of control population respectively. In a study by Mangalam et al. about 55.1% the cases and 54.3% of the controls were studied up to matric, 25.6% of the cases and 25.7 % of the controls were upto intermediate , 19.2% of the cases and 20.0% of the controls were upto graduate. [9] Unskilled workers formed the majority of the cases in this study. There was no statistically significant difference between the cases and controls with respect to Occupational status and thus ensuring the

comparability between the casesand controls. In the present study, there was no statistically significant difference between the cases and controls with respect to Income and thus ensuring the comparability between the cases and controls. In the present study the mean Standardized Mini Mental Status Examination (SMMSE) score among the cases was 21.32 ± 3.8 and 28.2 ±1.1 in controls. The present study had low SMMSE scores in the schizophrenia patients than compared with previous studies. [10,11]

In the present study, the mean difference of BCRS score of Axis-1, Axis-2, Axis-3, Axis-4, and Axis-5 between the cases and controls shows significant different. In a study done by Sreelatha et al. where they studied cognitive profile of first degree relatives of patients with schizophrenia using BCRS. The results of the study show similar results with our study. [12] In the present study, the mean difference of DSST scores among the cases and controls shows significant different. It reflects that schizophreniacases performed poorer than the controls in giving the correct responses within duration of 120 sec on DSST.

The present study results were similar with previous studies in relation to DSST scores among the schizophrenia patients. Most of the previous studies suggested that schizoprenia patients give less correct responses while performing DSST. In a study conducted by Jogems-Kosterman et al, Psychomotor slowing and planning deficits in Schizophrenia were studied with 19 patients and 19 healthy controls matched for age, sex and educational level. Dutch version of DST is used the standard test score on DST, the raw score was significantly lower in the patients compared with the controls. The patients had a significantly longer matching time compared with the controls. No significant differences in writing time and movement velocity were found between the two groups in this test. [13]

In the present study, the mean difference of Trail making – A (TMT _A) scores among the cases and controls shows significant different. The mean difference of Trail making – B (TMT _B) scores among the cases and controls shows significant different. This show Schizophrenia patients are taking more time to complete the task when compared to healthy controls.

In a study conducted by Krishnadas et al., the mean trail making A was 77.24 (18.87) for Cases and 39.80 (3.00) for controls and it was statistically significant with a P value < 0.01. And the Trail making B the mean value for cases 150.76 (17.32) and for controls 79.72 (7.71) this was statistically significant with p < 0.01. [10] In the present study, on comparison of duration of illness with SMMSE, DSST,TMT-A,TMT-A errors, TMT-B, TMT-B errors and BCRS, there was statistically significant difference seen with SMMSE, DSST, BCRS Axis-1, Axis-2, Axis-3 and Axis-5 .This indicates that as duration of illness increases the cognitive deficits increases. The Present study results were similar to previous studies in relation to comparison of duration of illness with the cognitive dysfunction. Davidson etal. conducted a study Severity of symptoms in chronically institutionalized geriatric schizophrenic patients and found that a decline of two to three points per decade in a global measure of cognitive functioning. [14]

In the present study on comparison of age with SMMSE score was statistically significant. The results showed no significant difference in cognitive dysfunction in relation to age. That indicates that as ageadvances cognitive deficits are more. On comparison of age with BCRS. On comparison with DSST, TMT-A, TMT-A errors, MT-B and TMT-B errors no significant association between age and these tests. In a study by Talreja et al. found no association between age and MMSE score. [15] The results show that cognitive dysfunction is more in males when compared to females.

In a study by Goldstein, Seidman, Goodman et al study results showed that Male patients were significantly impaired across all functions in comparison with normal male subjects and on tests of attention, verbal memory & executive functions in comparison with female patients. Female patients performed significantly worse than female normal comparison subjects only on tests of attention, executive functions, visual memory, and motor functions. The results were similar to our results. [16]

In the present study on comparison of residence with the test, the results showed that P value is significant for SMMSE, DSST, TMT-A and errors, TMT-B. For BCRS P value is significant for the entire five axis. This indicates that cognitive impairment is more in people from urban areas. In a study by Talreja, et al on comparison of cognitive dysfunction with domicile status. The results showed that Most of the patients belonged to urban habitat (P<0.05).The results are similar to our results. In the present study on comparison of marital status with the tests, the resultsshowed that married had significant association with SMMSE scores.

In a study by Talreja et al, unmarried patients had an association with MMSE score with significant. Whereas no significant association was found between marital status and ACER score.

The results showed no significant association between family type and SMMSE, DSST, TMT-A & B and BCRS. No relationship was found between family type and cognitive dysfunction.

In the present study on comparison of education status with the tests, the results showed that The P

value is significant for SMMSE, DSST, TMT-A and TMT-A errors. P value is significant for BCRS Axis-2.This shows that cognitive impairment is more in people with education status Primary school and middle school. In a study by Sreenivasan et al. where 100 schizophrenics and 100 healthy controls are tested results showed that significant correlations (p<0.05) among scores on cognitive tests with education, more years ofeducation positively influenced performance on tasks that tested attention, executive function, memory and constructional ability.

They concluded that Patients with good education did well on cognitive tasks because of this inherent capability. [17] In the present study on comparison of employment with the tests, results showed that the P value is significant for SMMSE and DSST. P value is significant for Axis–1(concentration). This indicates that cognitive impairment is more in unemployed. In the present study on comparison of income with the tests, results showed that the p value is significant for SMMSE, DSST, TMT-A, and BCRS Axis-1, Axis-2, and Axis-3.

Conclusion

Comparison of sociodemographic profile with SMMSE, Digit symbol substitution test, Trail making tests A & B and BCRS showed that Cognitive deficits are more in males, people from urban areas, educated upto primary/middle school, and unemployed. Comparison of duration of illness with SMMSE, DSST, Trail making tests A & B and BCRS shows that as duration of illness increases the cognitive deficits increases.

References

1. World Health Organization. Schizophrenia Fact Sheets. affects%20 approximately% 2024%20million,as%20many%20other%20mental%20disorders;2022. https://www.who.int/news-room/fact sheets/ detail/schizophrenia #:~: text=Schizophrenia%20.Return to ref 1 in article

2. James SL, Abate D, Abate KH, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet. 2018; 392(10159):1789–858.

3. Altamura C, Fagiolini A, Galderisi S, Rocca P, Rossi A. Schizophrenia today: epidemiology, diagnosis, course and models of care. Journal of Psychopathology. 2014 Sep; 20:223-43.

4. Bodenhausen GV, Morales JR. Social cognition and perception. Handbook of Psychology, Second Edition. 2012 Sep 26; 5.

5. Elvevag B, Goldberg TE. Cognitive impairment in schizophrenia is the core of the disorder. Critical Reviews™ in Neurobiology. 2000; 14(1).

6. Tandon R, Nasrallah HA, Keshavan MS. Schizophrenia,"just the facts" 4. Clinical features and conceptualization. Schizophrenia research. 2009 May 1; 110(1-3):1-23.

7. Bachman P, Reichenberg A, Rice P, Woolsey M, Chaves O, Martinez D et al. Deconstructing processing speed deficits in schizophrenia: Application of a parametric digit symbol coding test. Schizophrenia Research. 2010;118(1-3):6-11.

8. Saykin A. Neuropsychological Function in Schizophrenia. Archives of General Psychiatry. 1991; 48(7):618.

9. Mangalam et al. Working Memory in Schizophrenia. German J Psychiatry 2010; 13 (3) 116–120.

10. Krishnadas R, Moore B, Nayak A, Patel R. Relationship of cognitive function in patients with schizophrenia in remission to disability: a cross-sectional study in an Indian sample. Annals of General Psychiatry. 2007; 6(1):19.

11. Arapidis K, Rafu-Arapidi G, Taratsidou I, Fokas K, Kaprinis G. Assessment of cognitive function with MMSE in chronic schizophrenic inpatients. Annals of General Psychiatry. 2008; 7(Suppl 1):S215.

12. Sreelatha. P and Penzil Pinto. Cognitive Profile of First-Degree Relatives of Patients with Schizophrenia. Indian Journal of Psychosocial Sciences.2015; 5:30- 35.

13. Jogems-Kosterman B, Zitman F, Van Hoof J, Hulstijn W. Psychomotor slowing and planning deficits in schizophrenia. Schizophrenia Research. 2001; 48(2-3):317-333.

14. Davidson M, Harvey PD, Powchik P, et al. Severity of symptoms in chronically institutionalized geriatric schizophrenic patients. American Journal of Psychiatry. 1995; 152(2):197-207.

15. Talreja B, Kataria L, Shah S. Cognitive function in schizophrenia and its association with socio-demographics factors. Industrial Psychiatry Journal. 2013; 22(1):47.

16. Goldstein J, Seidman L, Goodman J, Koren D, Lee H, Weintraub S et al. Are There Sex Differences in Neuropsychological Functions Among Patients with Schizophrenia? American Journal of Psychiatry. 1998; 155(10):1358-1364.

17. Srinivasan L, Thara R, Tirupati S. Cognitive dysfunction and associated factors in patients with chronic schizophrenia. Indian Journal of Psychiatry. 2005; 47(3):139.