

STUDY ON THE WISCONSIN CARD SORTING TEST AMONG EARLY AND LATE ONSET SCHIZOPHRENIA: A COMPARATIVE CLINICAL STUDY

Rajendra Kumar Sharma

Associate Professor, Department of Clinical Psychology (AIBAS), Amity University Gwalior, Madhya Pradesh, India

Received: 14 Jan 2020

Accepted: 20 Jan 2020

Published: 31 Feb 2020

ABSTRACT

Background – WCST is the commonly and globally most widely used psychological test, which measures the executive function. Research related to WCST performance reveals that schizophrenia clients have consistently been shown to perform worse than normal controls on the WCST in all dimensional aspects. Hence, in this study, we have tried to investigate this relationship between the WCST performance and an early onset schizophrenic and late onset schizophrenia with a specific emphasis on the executive function dichotomy on this test. The purpose of present study was to compare the performance of clients with early and late onset schizophrenia and control clients on the Wisconsin Card Sorting. Data and related information elicited from Gajra Raja Medical Collage (GRMC) Gwalior. **Sample:** A group of forty male schizophrenic clients between the age ranges of eighteen to forty-two years were taken for this study. Twenty clients were of (EOS) eighteen to thirty years and twenty patients were of (LOS) thirty-one to forty-two. **Result** - It has been revealed that early onset schizophrenic patients and late onset schizophrenic patients showed greater cognitive dysfunctions in comparison to normal control subjects. In comparison, early onset schizophrenic patients and late onset schizophrenic patients had marginal executive dysfunction in comparison to early onset schizophrenia and difference was significant at 0.001 level.

KEYWORDS: Schizophrenia, Cognition, Executive Function, Early and Late Onset Schizophrenic

INTRODUCTION

Cognitive impairment in schizophrenia has been reported across all relevant research. Subsequently, since the beginning of the schizophrenic spectrum, it has been noted and described that schizophrenic patients have poor performance on the test of cognitive neuropsychological domains. However, this is not a new finding. Hunt and Cofer has reviewed fifty years of literature on executive function and impairment in schizophrenia, covering many of the areas of deficit, such as problem solving, concept formation, decision-making, inhibitory control cognitive flexibility, visual spatial, working memory and set shifting. WCST is the commonly and globally most widely used psychological test which measures the executive function. Research related to WCST performance reveals that schizophrenic clients have consistently been shown to perform worse than normal controls on the WCST all dimensional aspects. Hence, in this study, we have tried to investigate this relationship between the WCST performance and early onset schizophrenia and late onset schizophrenia with a specific emphasis on the executive function dichotomy on this test.

METHODOLOGY

The study was conducted at the Gajra Raja Medical Collage (GRMC) Gwalior, Department of Psychiatry, Madhya

Pradesh, India. Study sampling was purposive, comprised forty schizophrenic patients, (DCR-ICD-10) and fulfilling our inclusion and exclusion criteria.

Inclusion Criteria (EOS)

- Index client diagnosed with schizophrenia.
- Gender – Male.
- Right-handed.
- Client at age range eighteen to thirty (early onset).
- Educated up to fifth standard.
- Patient cooperative for testing.

Exclusion Criteria (EOS)

- History of any other psychiatric or personality disorder.
- History of head injury or other organicity, substance abuse, or mental, retardation.
- Poor eyesight or hearing impairment.
- Patients who are not able to cooperate.

Inclusion Criteria for Late Onset Schizophrenics (LOS):

- Index client diagnosed with schizophrenia.
- Gender – Male.
- Right-handed.
- Client at age range thirty-one to forty two.
- Educated up to 5th standard.

Exclusion Criteria for Late Onset Schizophrenics (LOS):

- History of any other psychiatric disorder or personality disorder.
- History of brain injury or other organicity, or history of substance abuse, or mental retardation.
- Poor eyesight or hearing impairment.
- Patients who are not able to cooperate.

Normal Control (NC)

The twenty control group subjects, who had no history of alcohol were taken for the study. The normal control was matched in terms of age and education. (GHQ – 12)General Health Questionnaire have been administered on them.

Administered Tools for Study

- Clinical Data Sheet for relevant primary data.
- General Health Questionnaire (GHQ-12) - For normal control clients.
- Wisconsin card sorting test (WCST) contains four stimulus cards and two identical decks of sixty-four response cards with figure of varying forms, color and number. First deck of response card is given to the client with instruction to be observed and matchall stimulus card from the bunch of deck with the four stimuli. When the client has finished the number of consecutive correct matches, the sorting principles change, and (WCST) proceeds in the same way through several shifts in a set. To make the finding more objective and comparable across studies Heaton and colleagues provided a standard method of administering and scoring WCST according to which fourteen scores are yielded.

RESULTS AND DISCUSSIONS

Table 1: Primary Data Interpretation (NC & EOS – 40 and LOS-20)

Primary Data Variables		(Mean ± SD/n (%) NC	Mean ± SD/n (%) EOS	Mean ± SD/n (%) LOS	χ ² /f	df	Level of significance
Age		28.39±6.93	28.74±2.05	28.21±5.27	35.20	-	-
Marital Status	Single	13 (65)	8(40)	5(25)	6.65*	2	0.05
	Married	7 (35)	12(60)	15(7)			
Education	10 th Gr. Above	13 (65)	14 (70)	15 (75)	44.47***	6	0.001
	10 th Gr. Up to	07 (35)	04 (20)	05 (25)			
Occupation	Not working	3 (15)	1 (5)	1 (10)	20.00**	6	0.01
	Semi-skilled	11 (55)	15 (75)	12 (60)			
	Skilled	6 (30)	4 (20)	6 (30)			
Domicile	Rural	2 (10)	15 (75)	13 (65)	33.51***	4	0.001
	Semi Urban	1 (5)	4 (20)	4 (20)			
	Urban	17 (85)	1 (5)	3(15)			
SES	LSSES	3 (15)	16 (80)	15 (75)	22.48***	4	0.001
	MSES	16 (80)	3 (15)	5 (25)			
	HSES	1 (5)	1 (5)	---			

(*P < 0.05, ** P < 0.01, *** P < 0.001)

Table 1: Describes Sociodemography of the entire sample. There are no significant differences among three groups, which were propounded in this primary data except their age.

Table 2: Performance of (NC, EOS AND LOS) on WCST

Variable	NC	EOS	LOS	f Value	Post hoc Test
No. of trails administered	101.50±17.28	127.65±1.56	125.10±12.96	26.57	a<b*** a<b***
Total no. of correct resp.	68.30±5.32	57.25±19.12	56.90±14.96	4.08	a>b* a>c*
Total no. of errors.	33.90±14.94	70.40±19.73	68.20±20.27	24.55	a<b*** a<c***
%Errors	30.90±9.58	54.95±15.47	52.70±15.44	18.51	a<b*** a<c***
Perseverative response (PR)	22.45±10.29	60.70±38.16	42.65±23.92	10.29	a<b*** a<c***
% PR	21.35±6.93	47.35±29.79	21.35±6.93	13.74	a<b*** a<c***

Perseverative errors (PE)	21.15±9.03	49.70±30.82	44.75±22.83	8.99	a<b*** a<c***
% PE	20.30±5.87	38.80±24.01	35.00±17.76	6.17	a<b* a<c*
Non-Perseverative response (NPR)	8.45±7.56	20.55±14.89	20.05±13.36	6.14	a<b* a<c*
%NPR	7.25±5.88	16.05±11.43	16.25±9.50	6.19	a<b* a<c*
Conceptual level response (CLR)	62.05±8.35	31.20±22.40	32.85±20.37	18.30	a>b*** a>c***
%CLR	60.55±12.33	24.25±17.38	25.60±15.86	35.98	a>b*** a>c***
No. of categories completed.	5.15±1.66	1.65±1.81	1.95±2.01	22.33	a>b*** a>c***
Trials taken to complete 1 st categories	13.50±5.05	13.95±14.72	21.35±31.26	0.956	a<c*
Failure to maintain set	17.61±3.92	12.05±5.53	17.51±9.12	1.87	a>b*
Learning to learn	17.62±8.66	11.14±16.63	0.00±0.00	24.47	a>b*** a>c***

*P < 0.05, ** P < 0.01, *** P < 0.001

Table 2: -EOS clients show more cognitive dysfunctions than normal control subjects, as the number of trails administered to the MAT 0.001. Comparing the trails administered to NC clients and LOS, late-onset schizophrenic patients were more impaired cognitively in comparison to normal control subjects at 0.001 on Wisconsin Card Sorting Test. Total number of correct responses given by normal control subjects were high in comparison to early onset schizophrenics and late onset schizophrenic clients 0.05. EOS and LOS clients showed greater cognitive dysfunctions in comparison to normal control subjects. While computing the number of errors, NC clients performed better side on (WCST). In comparison, EOS and LOS clients were significant at 0.001. These results also indicate that early onset schizophrenics and late onset schizophrenic patients showed more cognitive dysfunctions in comparison to NC clients. Significantly higher perseverative responses have been observed in the groups of early onset schizophrenic patients. In comparison to normal control subjects and late-onset schizophrenic patients, late-onset schizophrenics made more perseverative responses in comparison to normal control subjects and the difference was significant at 0.001 level statistically. Early onset schizophrenic clients committed significantly more percentage perseverative responses in comparison to normal control subjects and late-onset schizophrenic patients. Significantly, more perseverative errors have been committed by EOS clients in comparison to normal NC and LOS, which suggests more cognitive dysfunctions in these groups. In the process of performance on Wisconsin Card Sorting Test (WCST), NC clients have completed significantly more number of categories in comparison to LOC schizophrenic clients, which again indicates higher cognitive dysfunctions among EOD clients and LOS in comparison to NC clients. LOS took more trails to complete the first category in comparison to NC clients and EOD clients, that indicates more cognitive dysfunction in the groups of LOS clients. EOS clients showed failure to maintain set in comparison to NC clients and LOS clients. NC clients show significantly higher alertness, while maintaining their set in comparison to both clinical groups (EOS and LOS clients) and the difference was significant at 0.05. LOS clients showed poor ability to learn in comparison to NC clients and EOD clients. NC clients were quite capable to learn in comparison to EOS clients and LOS client's difference was observed at 0.001. Significant difference between the performance of EOS and LOS was found on all the measures of WCST. McKenna *et al.* (1990) in their study have also observed significant difference between EOS and LOS clients on the

measures of perseverative error of WCST. Similar findings were reported by Robert Howard *et al.* (2000). In their study, they have also observed significant difference between EOS and LOS. He concluded that early-onset clients seem to be impaired on most of the cognitive tasks. Late-onset schizophrenic clients are significantly well in comparison to early-onset schizophrenics.

CONCLUSIONS

Finally, it can be concluded that cognitive functioning of schizophrenics is impaired in comparison to normal subjects. Within the schizophrenic groups, more impairment exists in early-onset schizophrenic patients.

REFERENCES

1. Alexandru, T., Dragos, I., & Eugen, A. (2011). Adopting and implementing the Wisconsin card sorting Test, *Procedia Soc. Behav. Sci.*, 33, 1022–1026.
2. Goldstein, G., Minshew, N. J., Allen, D. N., & Seaton, B. E. (2002). High-functioning autism and schizophrenia A comparison of an early and late onset neuro developmental disorder. *Archives of Clinical Neuropsychology*, 17(5), 461-475.
3. Addington, J., Addington, D. and Maticka-Tyndale, E. cognitive functioning and positive and negative symptoms in schizophrenia. *Schizophr. Res.* 1991; 5:123 – 34.
4. American Psychiatric Association (2013). *Diagnostic and Statistical Manual of Mental Disorders (5th edn.)*. Arlington, VA, American Psychiatric Association.
5. Berman, I., Viegner, B., Merson, A., Allan, E., Pappas, D., Green, A. I. Differential relationships between positive and negative symptoms and neuropsychological deficits in schizophrenia. *Schizophr. Res.* 1997; 25:1 – 10.
6. Braff, D. L., Heaton, R., Kuck, J., Cullum, M., Moranville, J., Grant, I. et al. The generalized pattern of neuropsychological deficits in outpatients with chronic schizophrenia with heterogeneous Wisconsin card sorting test results. *Arch. Gen. Psy.* 1991; 48:891 – 8.
7. Cuesta, M. J., Peralta, V., Caro, F., de Leon J. Schizophrenic syndrome and Wisconsin card sorting test dimensions. *Psychiatry Res.* 1995; 58:45 – 51.
8. Graham, P. J. T. & Verhulst, F. C. (1999). *Child psychiatry: A developmental approach (3rd edn., pp. 110–120)*. Great Britain: Oxford University Press.
9. Hartman & Grep. (2004). Is ADHD a brain damage? *J. Clin. Exp. Neuropsychol.* , 22(2), 247–256.
10. Heaton, R. K. *Wisconsin Card Sorting Test Manual*. Odessa, FL: Psychological Assessment Resources; 1981.
11. Heaton, H. K., Cheloune, G. J., Tally, J. L., Kay, G. G. and Curtiss, G. *Wisconsin Card Sorting Test Manual Revised and Expanded*. Odessa, FL: Psychological Assessment Resources; 1993.
12. Heinrichs, R. W. and Zakzanis, K. K. Neurocognitive deficit in schizophrenia: A quantitative review of the evidence. *Neuropsychology*. 1998; 12:426 – 45.
13. Hammer, M. A., Katsanis, J., Iacono, W. G. *The relationship between negative symptoms and neuropsychological*

- performance. *Biol. Psychiatry*. 1995; 37:828 – 30.
14. Mullane, J. C., & Vicorkum P. V. (2007). *The relationship between Working Memory, Inhibition and Performance on the Wisconsin card sorting Assessment*. *Journal Title*, 25(3), 211–221.
 15. Marder, S. R. and Fenton, W. *Measurement and treatment research to improve cognition in schizophrenia: NIMH MATRICS initiative to support the development of agents for improving cognition in schizophrenia*. *Schizophr. Res.* 2004; 72:5–9.
 16. Parellada, E., Catarineu, S., Catafau, A., Bernardo, M. and Lomeña, F. *Psychopathology and Wisconsin card sorting test performance in young unmedicated schizophrenic patients*. *Psychopathology*. 2000; 33:14 – 8.
 17. Sadock, B. J. & Sadock, V. A. (2003). *Kaplan & Sadock: Synopsis of psychiatry (9th edn.)*. 17.Lippincott William & Wilkins Sadock, B. J. & Sadock, V. A. (2005). *Kaplan Sadock's: Comprehensive Textbook of Psychiatry (8th edn.)* LIPPINCOTT Williams & Wilkins.
 18. Sagvolden et al. (2005). *Frontal and executive dysfunction is a central aspect of ADHD*. *Behav. Brain Sci.*, 28(3), 427.
 19. Stovart & Fronchi. (2006). *Comparison performance of brain at inpatient's children in Barkly Hospital*. *J. Clin. Child Adolesc.*, 25, 119 –125.

AUTHORS PROFILE



DR. RAJENDRA KUMAR SHARMA

Ph. D. (Psychology) from Barkatullah University Bhopal, Madhya Pradesh, India. M.Phil. (Clinical Psychology) from Ranchi Institute of Neuropsychiatry and Allied Science, (RINPAS) Ranchi, Jharkhand. M. A. (Applied Psychology) Specialized in Clinical Psychology, Psychotherapy, Health & Population and Organizational Behavior) from Ranchi University, Ranchi, India. Bachelor's in Journalism & Mass Communication, Specialized in Public Relation and Advertisement from Ranchi University, Ranchi, India. Four years' experience as Associate Professor and Head of Clinical Psychology Department, Amity University, Gwalior and Madhya Pradesh. Responsible for Administration, Heading the Department, teaching students of M. Phil. Clinical Psychology as well as dealing with inpatients and outpatient department of Psychiatry, providing psychological assessment and psychotherapy to patients in Gajra Raja Medical College, Gwalior. Six Years' experience as Lecturer and Head of Clinical Psychology Department, Composite Regional Centre for Persons with Disabilities, Bhopal- Ministry of Social Justice & Empowerment, Government of India. Teaching the Postgraduate and Undergraduate students of Applied Psychology & Behavioral Science. Guiding research paper and dissertations to PG

Psychology & UG students. Conducted Rehabilitation Education Program for Co-professionals from various parts of India. Having more than 20 national and international papers. Registered Rehabilitation Council of India - Registration/CRR No. A10589.

