



# Set-shifting ability in patient with frontal lobe impairment and early-onset schizophrenia: A comparative study

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## ABSTRACT

*The current study aim was first, to examine early-onset schizophrenia and frontal lobe impair Performances on Stroop test. Methods: Based on purposive sampling method a group of thirty male schizophrenic patients between the age ranges of 18 to 35 years will be selected and thirty frontal lobes impaired at the same age group. The diagnosis will be according to the DCR, ICD – 10. Results: Schizophrenic Group (SG) and Frontal lobe impaired Group (FLIG) scores Negative Syndrome Scale in both patients group using independent samples t-test. Schizophrenic Group scores were significantly lower than the Frontal lobe impaired Group scores. There was no significant found on it.*

**Keywords:** Early onset schizophrenia, Frontal lobe Impairment, and Cognition.

## 1. INTRODUCTION

Cognition indicates to the process whereby individuals acquire knowledge of the highest level of various mental processes as perception, abstract thinking, memory, problem-solving and related to executive functions such as planning, choosing strategies, set shifting. Perception is a central step in the processing of sensory information perceived through sensory systems and later transformed into higher order codes for use by the various higher order cognitive subsystems. Executive functioning has encompassed a number of meanings. It is a integrate information perceived in the external world and transform perception into higher order symbols, compare incoming information with what knowledge stored in memory and Combine those incoming perceptions with information about the person's internal physiological state and biological drives.

Advanced order cognitive functions are related to frontal lobes. When lesion occurs in the frontal lobe, it manifests itself in several ways including set shifting. Recognition of the potential importance of cognitive dysfunction in schizophrenia dates back to Kraepelin when he first described Dementia Praecox in 1919. He noted that while many of the basic cognitive skills (such -as memory or retention and general orientation) remain relatively intact in this disorder, apparent decrements in some skills, such as attention and judgment, appeared to reflect an underlying deficit in the process of volition. He further suggested that the deficit in higher intellectual abilities might involve the frontal brain regions. It appears that he was not using the term higher intellectual abilities in the restricted sense as measured by contemporary IQ scales, but rather in a sense similar to contemporary notions of executive skills (Zec, 1995). At the very end of 20th century, there was a resurgence of interest in cognition in schizophrenia. This interest was partially spurred by the realization that functional deficits in schizophrenia are responsible for a large amount of the disability and indirect costs of the illness and the recognition that cognitive deficits are largely responsible for these functional deficits.

### Early Onset and Schizophrenia

Three-fourth of all schizophrenias begins with a pre-psychotic prodromal phase, which lasts several times longer than the psychotic pre-phase. Since an extended pre-treatment course of schizophrenia, as mentioned at the outset, is associated with an unfavorable prognosis, the question arises how the early phases of schizophrenia can be made accessible to therapy. By suitable measures, it might be possible to delay or even prevent the onset of the first episode. It might be that part of schizophrenias actually comes to a halt before the first positive symptoms appear. Such cases are probably encountered as sub-threshold conditions with primarily negative or nonspecific symptomatology in epidemiological family studies (Bassett et al, 1994; Mater et al., 1993). Deficits in social development come about in the prodromal phase. At this stage failure to reach the expected social status plays a greater role than steps of social decline, which gain in relevance after the main social roles, have been acquired. Due to their lower age of onset and

probably also their more frequent socially negative illness behavior males are socially more disadvantaged in the early course of schizophrenia compared with females. In contrast, symptomatology and, surprisingly, type of onset does not seem to have any significant influence on the crudely measured two-year outcomes of social disability.

### **Cognitive processing and Frontal Lobe Manifestation**

The frontal lobe is the largest lobe of the brain, yet it is often not specifically evaluated in routine neurologic examinations. This may in part be due to the attention to detail and rigorous testing strategies required probing frontal lobe functions. As successful completion of any cognitive task considered a frontal lobe function requires multiple brain regions both within and outside the frontal lobe, some authors prefer the term frontal systems impairment. In any case, dysfunctions of the frontal lobe can give rise to relatively specific clinical syndromes.

### **Positive and Negative Symptoms**

Schizophrenia is a chronic and severe mental illness characterized by multiple symptom dimensions. One of these classes of symptoms, “negative symptoms”, has received more attention over the last few years. Negative symptoms includes blunted affect, withdrawal or apathy, are particularly important for recovery and are associated with negative functional outcomes, such as the inability to get an employment and conduct normal daily living activities. While positive symptoms are usually treated with antipsychotic drugs, negative symptoms are usually persistent, which indicates the need for better treatment. Some work has suggested that negative symptoms are inversely correlated with functional outcomes.

## **2. REVIEW OF LITERATURE**

Rosenberg (2016) published journal *Neuron* highlights groundbreaking studies of patients with brain damage. It reveals how distinct areas of the frontal lobes are critical for a person's ability to learn, multitask, control their emotions, socialize, and make real-life decisions. The findings have helped professional to rehabilitate patients experiencing damage to this region of the brain.

Vauth et al., 2007, published in the *Journal of Clinical Diagnostic Research* of a schizophrenic patient. The study emphasized the need to provide psychological assistance to a patient with frontal lobe is very important for quality of life. Milner (1963) administered WCST to 71 patients a few days before and approximately 18 days after surgical treatment of focal seizure disorder, lesions involving the DLPEC for 18 patient and non-frontal area for 53 patient. Both groups were matched on age and full-scale I.Q. The DLPF groups made significant more total error and preservative error on WCST prior to surgery than the control group. Following surgery, the groups showed very different patterns of change on the WCST subjects in the DLPFC group their presurgery performance and subjects in the control group showed a modest improvement.

Hagger et al. (1993) assessed 36 treatment-refractory schizophrenic patients before and after initiation of clozapine therapy. The authors found a significant improvement in the Controlled oral word association test 6 wk. following clozapine therapy onset and, in addition, after 6 months in the Category instance generation test. Improvement also occurred in tests of executive function, attention and recall memory.

Lee et al.,(1994) compared neuropsychological test performance with clozapine versus haloperidol treatment in a 10-wk double-blind study, followed by a one-year follow-up assessment. These study confirmed improvements in some cognitive domains including visuospatial and executive functions. Sullivan et al, (1993) in his study compared the performance of a mixed group of 58 subjects including 16 normal comparison subjects, 22 patient with schizophrenia, 20 patient with chronic alcoholism and seven patients with frontal lobe lesion invading the dorsolateral area on WCST. Results revealed that both schizophrenic and frontal lobe groups had the highest preservation factors scores. More over only within the schizophrenia patient the preservation factors showed convergent and discriminate validity indicating that preservative factors may measure the activity of dorsolateral prefrontal cortex only in schizophrenia patient and not within the alcoholic patient.

## **3. OBJECTIVE OF THE STUDY**

- (i) To compare the performance of cognitive set shifting ability of normal control and early onset schizophrenia.
- (ii) To compare the performance of cognitive set shifting ability of normal control and frontal lobe impairment.
- (iii) To compare the performance of cognitive set-shifting ability in early-onset schizophrenia and frontal lobe impairment.

### **Hypotheses:**

- (i) That there will be no significant difference between frontal lobe impairment and early onset schizophrenia in cognitive functions and set-shifting ability.
- (ii) That there will be no significant cognitive difference between normal controls and frontal lobe impairment.
- (iii) That there will be no significant difference between normal controls and early-onset schizophrenia in cognitive functions.

## **4. SCOPE OF THE STUDY**

The findings of the study will provide the impetus for further exploration of the relationship between the two disorders. Investigation of the schizophrenia-like psychoses associated with frontal lobe impairment may inform our understanding of the neurobiological underpinnings of schizophrenia and frontal lobe impairment

## 5. METHODOLOGY

### Sample:

Based on purposive sampling method a group of thirty male schizophrenic patients between the age ranges of 18 to 35 years will be selected and thirty frontal lobes impaired at the same age group. The diagnosis will be according to the DCR, ICD – 10. Similarly, thirty normal controls were selected from different localities of Gwalior.

### Inclusion Criteria for Early Onset Schizophrenics:

- Patient diagnosed with Schizophrenia according to DCR, ICD – 10.
- Male/Female Patient.
- Right -Handed.
- Patient in the age range 18 to 35 years (early onset).
- Educated at least up to primary level.
- Patient-cooperative for testing.

### Exclusion Criteria Early Onset Schizophrenics:

- History of any other Psychiatric disorder or personality disorder.
- Poor eye sight or hearing impairment.
- Patients who are not able to cooperate.

### Inclusion Criteria for Frontal Lobe Impairment:

- Patient diagnosed frontal Lobe impairment, stroke, brain injury according to DCR, ICD – 10.
- Male/Female Patient.
- Right -Handed.
- Patient in the age range 18 to 35 years (late onset).
- Educated at least up to primary level.
- Patients who are cooperative.

### Exclusion Criteria Frontal Lobe Impairment:

- History of personality disorder.
- Poor eyesight or hearing impairment.
- Educated at least up to primary level.
- Patients who are not able to cooperate.

### Tools for the Assessments:

- Socio-demographic and clinical data sheet
- Handedness preference schedule (Manual et al 1992)
- Positive and Negative Syndrome Scale (Stanley Kay, Lewis Operand Abraham Fiszbein In 1987).
- Color Strop Test (John Ridley Strop in 1935).

**Socio-demographic and clinical data sheet:** Socio-Demographic and clinical data sheet: A semi-structured Performa will be used for recording details about the patients such as age, education, marital status, occupation, the age of onset of illness etc.

**Handedness preference schedule:** - To determine the handedness of the subject Hindi version of handedness preference schedule was used. It has items mainly based on culturally acquainted hand activities. The schedule consists of fifteen items and subjects are asked to indicate their hand preference for an activity on five-point rating scale (1-never, 2- rarely, 3 – occasionally, 4 – frequently and 5 – always).

**Positive and Negative Syndrome Scale:** The Positive and Negative Syndrome Scale (PANSS) is a medical scale used for measuring symptom severity in patients with schizophrenia. It was published in 1987 by Stanley Kay, Lewis Polar, and Abraham Fiszbein. It is widely used in the study of antipsychotic therapy. The name refers to the two types of symptoms in schizophrenia, as defined by the American Psychiatric Association: positive symptoms, which refer to an excess or distortion of normal functions (e.g., hallucinations and delusions), and negative symptoms, which represent a diminution or loss of normal functions. The PANSS is a relatively brief interview, requiring 45 to 50 minutes to administer. The interviewer must be trained to a standardized level of reliability. To assess a patient using PANSS, an approximately 45-minute clinical interview is conducted. The patient is rated from 1 to 7 on 30 different symptoms based on the interview as well as reports of family members or primary care hospital workers.

**Color Strop Test:** The Strop Color and Word Test (SCWT) is a neuropsychological test extensively used for both experimental and clinical purposes. It assesses the ability to inhibit cognitive interference, which occurs when the processing of a stimulus feature aspects the simultaneous processing of another attribute of the same stimulus (Strop, 1935). In the most common version of the SCWT, which was originally proposed by Strop in 1935, subjects are required to read three different tables as fast as possible. Two of them represent the “congruous condition” in which participants are required to read names of colors (henceforth referred to as color-words) printed in black ink (W) and name different color patches (C). Conversely, in the third table, named color-word (CW) condition, color-words are printed in an inconsistent color ink (for instance the word “red” is printed in green ink). Thus, in this

incongruent condition, participants are required to name the color of the ink instead of reading the word. The participants are required to perform a less automated task (i.e., naming ink color) while inhibiting the interference arising from a more automated task (i.e., reading the word; MacLeod and Dunbar, 1988; Ivnik et al., 1996). This difficulty in inhibiting the more automated process is called the Stroop effect (Stroop, 1935).

## 6. RESULTS

**Table: 1. Socio-Demographic Profile of (30) Early onset Schizophrenia (30) and (30) Frontal lobe impaired Group (FLIG)**

Variable		Early Onset Schizophrenia mean	Frontal lobe impaired Group ±	$\chi^2 / F$	df	Level of significance
Age		27.66±3.06	29.43±3.17	34.20	-	NS
Marital Status	Unmarried	8(27)	10(33)	6.65*	2	0.05
	Married	22(73)	20(67)			
Education	Up to Matric	25(75)	26(86)	46.58***	4	0.001
	Above Matric	5(25)	4(14)			
Occupation	Unemployed	01(3)	10(34)	12.00*	4	0.01
	Semi-skilled	15(50)	15(50)			
	Skilled	14(47)	05(16)			
Domicile	Rural	11(37)	09(30)	33.51***	6	0.001
	Urban	19(63)	21(70)			

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

It is clear from Table 1 which gives descriptive information about the socio-demographic characteristics of the entire sample, which was divided into two groups –early-onset schizophrenia and Frontal lobe impaired Group.

The mean age of early onset and frontal lobe impaired Group were 27.66±3.06 and 29.43±3.17 respectively. It is clear from the table that there is no significant difference between two groups, regarding their age. Though, there is marked the mean difference between the age of early onset and frontal lobe impaired Group. Frontal lobe impaired Group was older than that of early onset of schizophrenics.

Marital status of the subjects has been taken into account. It has been observed that 27% early onset of schizophrenics were unmarried 73% of the patients were married. Respectively 33% of the frontal lobe impaired Group were unmarried and 67 % t of these patients were married.

When education of the subjects has been taken into consideration. It has been observed that in early-onset schizophrenic 75% of patients were educated up to higher secondary level 25 percent patients were educated up to higher secondary level In the group of frontal lobe impaired 86% of the patients were educated up to higher secondary level rest 14% educated up to above than higher secondary level.

When the occupation of the subjects have been taken into account, it has been observed that higher representation in employed groups and schizophrenic patient both (Early onset). Lower representation from frontal lobe impaired probable patients reason may be their enduring illness, frequent hospitalizations, which might have affected their stability in working area.

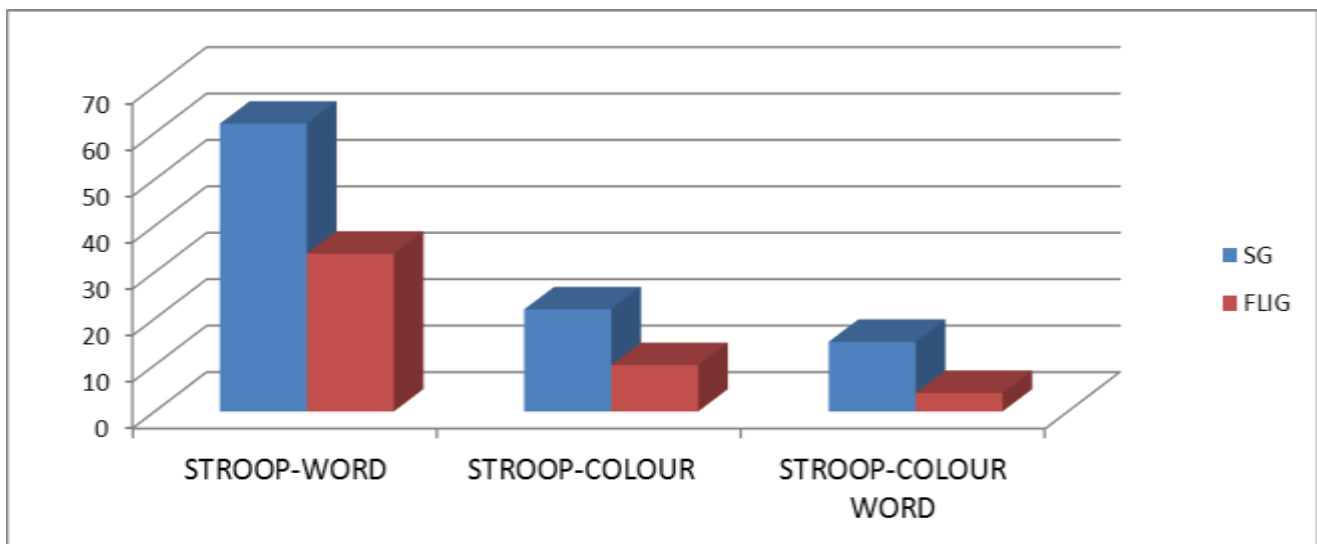
When domicile of the patients has been taken into consideration it has been observed that 63% of the patients were the urban group for early onset schizophrenic group rest 37% rural background. In the group of frontal lobe impairment, 70% t of the patients were belonging to an urban area and 30% of the patient was from the rural area.

**Table-2. Comparison of schizophrenic and frontal lobe impaired of Patients Negative Syndrome Scale (PANSS) (N=30+30=60)**

	Schizophrenic Group (SG)	Frontal lobe impaired Group (FLIG)	t	df	p
<b>PANSS-Positive</b>	84.77±2.10	22.13±1.22	2.96	14	.070
<b>PANSS-Negative</b>	23.54±2.42	23.93±3.81	0.65	14	.062
<b>PANSS-General Psychopathology</b>	102.07±2.64	29.16±2.17	3.16	14	.001**

\*\*p<.01

Table 2: shows a comparison of Schizophrenic Group (SG) and Frontal lobe impaired Group (FLIG) scores Negative Syndrome Scale in both patients group using independent samples t-test. Schizophrenic Group scores were significantly lower than the Frontal lobe impaired Group scores. There was no significant found on it.

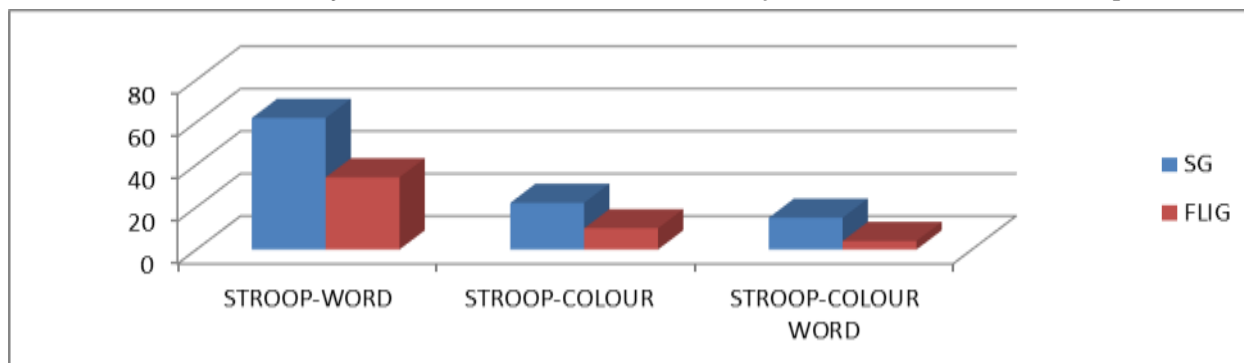


**Table-3. Comparison of schizophrenic and frontal lobe impaired of Patients on STROOP-TEST. (N=30+30=60)**

	Schizophrenic Group (SG)	Frontal lobe impaired Group (FLIG)	t	df	p
	Mean ± SD	Mean ± SD			
<b>STROOP-WORD</b>	62.45±14.26	34.64±11.18	2.10	12	.48
<b>STROOP-COLOUR</b>	22.70 ±8.19	10.06±5.82	4.20	12	.000***
<b>STROOP-COLOUR WORD</b>	15.09±6.01	04.83±7.73	3.55	12	.000***

\*\*\*p<.001

Table 3: shows comparison of Schizophrenic Group (SG) and Frontal lobe impaired Group (FLIG) scores of Stroop-test in both patients group using independent samples t-test. Schizophrenic Group scores were significantly higher (p<.001) than the Frontal lobe impaired Group scores.



## 7. DISCUSSION

Cognitive functions deficits are thought to be the key barrier for rehabilitation of early-onset schizophrenic and frontal lobes impairment. Cognitive intervention for both groups is very important to enhance quality of life. However positive reinforcement is also extremely significant to enhance the work performance improves the cognitive functions. Therefore frontal lobe rehabilitation program

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