

## Original Research Article

# Cognitive functions in first degree normative relative of patients with schizophrenia

Falguni A. Chaudhari<sup>1</sup>, Parag S. Shah<sup>1\*</sup>, Ujjwala Deshpandey<sup>2</sup>

<sup>1</sup>Department of Psychiatry, <sup>2</sup>Department of Pediatrics/CGC, Surat Municipal Institute of Medical Education and Research (SMIMER), Surat, Gujarat, India

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**\*Correspondence:**

Dr. Parag S. Shah,

E-mail: [drparagsshah@rediffmail.com](mailto:drparagsshah@rediffmail.com)

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### ABSTRACT

**Background:** Schizophrenia is severe disorders and imposes a considerable burden on patients, their families and society. Schizophrenia tends to run in family, like most mental disorder shows complex inheritance. Therefore, it is important to increase our knowledge about the disorder. Cognitive dysfunction is one of the core features of Schizophrenia. This study aims to compare the cognitive function of first degree unaffected relative of patient of schizophrenia and a group of healthy control.

**Methods:** The study include 48 first degree normative relative of patient with Schizophrenia and 48 controls. Compared for age, sex, education level. Cognitive functions of each case and control were assessed using TMT (Trail making Test), Paced auditory serial addition Test (PASAT) and Wisconsin card sorting test (WCST-64).

**Results:** First degree relative performed significantly poorly as compared to controls on Wisconsin card sorting Test-64 (WCST-64). No significant difference was observed in tests performances between first degree relative of Schizophrenia and control group for TMT (trail making test) and Paced auditory serial addition Test (PASAT).

**Conclusions:** The study shows possibility of cognitive impairment in first degree normative relative of Schizophrenia with regards to parameters like poor performance in shifting cognitive sets and poor understanding of test. Nevertheless, it is not clear weather this finding is an enduring trait mark or finding that fluctuates with sample size, nature of case and control.

**Keywords:** Cognitive function, First degree relative, Schizophrenia

### INTRODUCTION

Schizophrenia is a severe disorder, because of the early onset, frequent relapse and chronic course of illness. It imposes considerable burden on patient, families and society.<sup>1</sup>

The disorder usually begin before age of 25years and persist throughout life. It affects approximately 1% of total population. It is characterized by psychotic symptoms, disorganized behavior, impaired cognitive

functions and altered emotional reactivity.<sup>1</sup> The psychotic symptoms of schizophrenia are mainly divided into positive symptoms and negative symptoms. Positive symptoms include delusion, hallucinations and thought disorders. Negative symptoms include flat affect, poverty of speech, inability to experience pleasure, lack of motivation and social withdrawal.<sup>2</sup>

Patients of schizophrenia mostly perform poorly on a wide range of neuropsychological tests. Vigilance memory and concept formation are most affect which

suggest fronto-temporal lobe pathology.<sup>3,4</sup> Number of studies shows that premorbid sign and symptoms-cognitive and intellectual deficit are part of evolving schizophrenia and also shows evidence indicating that cognitive deficit are seen early in neuro development before the onset of psychotic symptoms.<sup>5</sup>

Schizophrenia tends to run in family, like most mental disorder shows complex inheritance, transition of disorder most likely involves several genes and environmental factor that transmit the predisposition to the illness but not necessary its expression. It is still much unknown about possible trait and more studies among schizophrenia patients and their relatives are needed to clearly estimate the range of heritability.<sup>6</sup> Trait markers are most useful when they are present in clinically unaffected relative of schizophrenia patient as research agrees that there is a high genetic contribution for developing schizophrenia.<sup>7</sup>

This study aims to compare the cognitive function of first degree normative relative of patient of schizophrenia and a group of healthy control.

## METHODS

This study was conducted in Department of Psychiatry-Outpatient clinic of a tertiary level hospital affiliated to a medical college. This study was approved by institutional ethical committee. Out of all the patient visiting the psychiatry OPD in a span of April 2018 to May 2018, every unaffected first degree relative of schizophrenia who fulfilled the selection criteria were requested to participate in the study and taken as 'case' and friend/non blood relative of a patient visiting the psychiatry OPD, who fulfilled the inclusion criteria were taken as 'control'. The case and controlled group were matched for age, gender and education. Sample selection method was convenience sampling.

The participants were between age 18years to 60years, being able to read and write Gujarati, Hindi and English language and give informed consent. First degree relative and control themselves were never diagnosed to have psychiatric illness and being free from any significant psychiatric and medical morbidity/on medication. They were interview with the semi-structured clinical interview for DSM-V and neuropsychological test was administered.

### Neuropsychological assessment

The trail making test (TMTs) is popular neuropsychological instrument to examine attention, mental flexibility, speed of processing and excusive function. In part A, the subject is asked to draw line to connect a series of 25 encircled numbers in numerical order. In part B subject connects 25 encircled numbers and letters in numerical and alphabetical order (e. g.; 1-A-2-B-3-C. etc.). The time take to complete part A and

part B are recorded in seconds. The Wisconsin card sorting test-64 (WCST-64) is used to assess the aspect of cognitive and neurological functioning. It measures planning strategies, excusive functions and abstract thinking, whereby participants are required to shift mental set as they match 64 cards on the basis of color, shapes or numbers with minimal instruction or feedback form the examiner. Paced auditory serial addition test (PASAT) is measure of cognitive function that specifically assesses auditory information processing speed and flexibility, as well as calculation ability. The subject is presented on audio CD to control of rate of stimulus presentation. Single digit is presented either every 3/2 second, and patient must add each new digit to the one immediately prior to it.

### Statistical analysis

All case and control data were analyzed by mean, Standard deviation and t test to look for any statistical significance.

## RESULTS

Table 1 shows comparison of case group and control group on various demographic parameters based on age, sex, and education. The group were not statistically different from each other and thus matched with each other in all these variables.

**Table 1: Socio-demographic profile of study.**

	Relative of schizophrenia	Control	Test (t test or $\chi^2$ )	P value
<b>Age</b>				
In years (mean)	27.82	30.96	1.796 (t test)	0.075
<b>Gender</b>				
Male	31	22	3.41 ( $\chi^2$ )	0.06
Female	17	26		
<b>Education</b>				
Primary	12	5	3.713( $\chi^2$ )	0.15
Secondary	16	29		
Graduation	10	14		

Table 2, there were no significant difference between first degree relative of Schizophrenia and control group in Trail A (p value = 0.611) and Trail B Test (p value = 0.057).

As shown in Table 2, the performance of first degree relative of schizophrenia with control show significantly poor performance in WCST Total (p value = 0.021), WCST Total Error (p value = 0.029), WCST perseverative response (p value = 0.033) and WCST conceptual level responses (p value = 0.004). However, first degree relative of schizophrenia with control did not differ significant difference in WCST perseverative error (p value = 0.097), non-perseverative error (p value = 0.068), category completed (p value = 0.332).

**Table 2: Comparison between first degree relative of schizophrenia and control.**

Trail A	Mean	Std. Deviation	t test	p value
Case	53.54	15.599	0.51	0.611
Control	55.21	16.407		
<b>Trail B</b>				
Case	100.1	34.207	1.931	0.057
Control	115.12	41.659		
<b>WCST</b>				
Total				
Case	40.21	7.426	2.354	0.021
Control	43.98	8.247		
Total error				
Case	23.6	7.097	2.215	0.029
Control	20.25	7.728		
Perseverative response				
Case	16.21	6.168	2.168	0.033
Control	13.4	6.539		
Perseverative error				
Case	14.38	5.549	1.675	0.097
Control	12.42	5.903		
Non perseverative error				
Case	9.33	4.478	1.843	0.068
Control	7.58	4.819		
Conceptual level				
Case	32.58	10.425	2.929	0.004
Control	38.94	10.83		
Category completed				
Case	2.38	1.084	0.975	0.332
Control	2.58	1.007		
<b>PASAT</b>				
Total A				
Case	53.6	7.707	1.879	0.063
Control	56.56	7.715		
Total B				
Case	55.06	8.342	1.229	0.222
Control	57	7.047		
Total A+B				
Case	108.67	14.679	1.658	0.101
Control	113.56	14.25		

As shown in Table 2, no difference was found in term of performance in PASAT-A (p value =0.063), PASAT-B (p value = 0.022) and PASAT A+ B (p value = 0.101) between first degree relative of schizophrenia and control group.

## DISCUSSION

In this study, we have used three different neuropsychological tests to explore cognitive function in first degree relative of schizophrenia and compare them with control group. For this study we prefer the test for

cognitive function like visual search, speed of processing, mental flexibility, calculation ability, quick assessment preservation and abstract reasoning.

TMT is one of most widely used test for neuropsychological assessment. The first degree relative of Schizophrenia in our sample demonstrated no impairment in trail making test A and B. In previous studies, TMT did not found specific deficit in case and control group.<sup>8</sup> Whereas in other studies, the TMT found significant deficits, which can be due to sample size and the type of relatives and control selected, accounting for the difference.<sup>9</sup>

In this study, on WCST- 64, first degree relative of Schizophrenia group performed poorly when compared with control which is statistically significant (p=0.021). Normative relative of schizophrenia made more number of errors (p=0.029), suggest that they had more difficulties in understanding the concept of test. Normative relative made significantly more perseverative response (p=0.033) which suggest they had difficulties in shifting between categories. The normative relative made significantly less number of conceptual level responses (p=0.004) which further support poor understanding of test. Statistical significant deficit parameters suggest that the normative relative of Schizophrenia had difficulties in trial and error learning, set shifting and understanding of problems as compared to control group. Usually for WCST-64, poor performance in schizophrenia indicate prefrontal cortical dysfunction, so result of WCST -64 in first degree normative relative of Schizophrenia could implicate similar pre frontal dysfunction.<sup>10</sup>

The PASAT test was developed to measure attention, concentration and some extant general intellectual ability.<sup>11</sup> No significant difference were observed in test performances between first degree relative of Schizophrenia and control group in our study.

## CONCLUSION

In conclusion, first degree normative relative of Schizophrenia, in WSCT-64 shows their inability to suppress previous incorrect response and difficulties in shifting cognitive sets. This finding may suggest possibility of cognitive impairment in first degree normative relative of Schizophrenia. Nevertheless it is not clear whether this finding suggest an enduring trait marker or impact of the small sample size as well as nature of case and control design. Further large sample size and further research is required to strengthen our current finding.

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