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Original Research

Prevalence of cognitive dysfunction in schizophrenia and its correlation with duration of illness: a cross sectional study

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ABSTRACT:

Background: Over the past 25 years, evidence has accrued to challenge in neurocognitive dysfunction in Schizophrenia. It is becoming evident that marked cognitive impairment is, in fact, the norm and often pre-dates the illness. There have been numerous studies done so far in these areas finding prevalence of cognitive dysfunction in schizophrenia. **Aims:** This study was aimed to identify the prevalence of cognitive dysfunction and its correlation with duration of schizophrenic illness. **Methodology:** Forty Schizophrenic patients were included in the study. Sample of the study than evaluated on semi-structured clinical proforma, the I.C.D. 10 classification of mental and behavioural disorders, to confirm the diagnosis, Positive and Negative syndrome scale (PANSS), P.G.I Battery of brain dysfunction (PGIBBD) to access cognitive deficit. **Results:** All 40 patients had cognitive dysfunction when measured on PGIBBD. The cognitive domain like memory parameters, verbal intelligence and visuo-motor were affected. The correlation of cognitive dysfunction and duration of schizophrenic illness, we found that although there was a "negative correlation" ("r" =- 0.1367). But this correlation was not statistical significance. ("p" value = 0.4001). In negative subtype of schizophrenia more dysfunction was found but negative subtype of schizophrenia patients were very few in the present study. **Conclusion:** Impairment of cognition in Schizophrenia is one of the core manifestations of the illness and it is not dependent on the duration of illness. But to substantiate our finding, larger and prospective studies required.

Key words: Cognitive dysfunction, PGI Battery of brain dysfunction, schizophrenia

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INTRODUCTION

Schizophrenia has been called "arguably the worst disease affecting mankind, even AIDS not excepted" – a clinical syndrome with a profound influence on public health.[1] It affects 1 % of general population.[2]

Schizophrenia is a clinical syndrome that involves cognition, emotion, perception, and other aspects of behaviour. It is characterized by disordered cognition, including a "gain of –function" in psychotic symptoms and a "loss of –function" in specific cognitive functions, such as working and declarative memory, but without the progressive dementia that characterizes classical neurodegenerative disorders.[3]

By Definition, "Cognition is the sum total of mental processes that makes us acquire knowledge and keeps us aware of our surroundings and thus enables us to arrive at appropriate judgments."[3] Broadly, cognition can be divided into 2 broad categories neurocognition and social cognition. Neurocognition is the process of cognition involving distinct brain areas and particular neural circuits. Social cognition includes those set of cognitive processes involved in interaction with the social world. [4]

Schizophrenia is nowadays viewed as a general cognitive disorder characterised by relatively stable cognitive impairments.[5,6]Cognitive impairments appear to be already present at the onset of the illness and also in non-psychotic siblings of patients with schizophrenia.[7,8,9]Cognitive deficits represent a core feature in schizophrenia and have substantial influence on the course of illness, on noncompliance, and on psychosocial functioning.[10,11]

Thus evaluation of Cognitive deficit in specific subgroups of Schizophrenia may be helpful in early intervention regarding cognitive deficit that can improve the course and prognosis of Schizophrenia. This cross sectional study has been aimed to identify correlation between cognitive dysfunction and duration of schizophrenic illness.

METHOLODOLOGY

This study has been conducted in the department of Psychiatry, Geetanjali Medical College & Hospital, Udaipur (GMCH), Rajasthan. The study was approved by Institutional Ethics Committee, of GMCH. The period of study extended from December 2015 to August 2016.

The sample comprises of forty consecutively selected subjects attending outpatient department (OPD) diagnosed as Schizophrenia. The Inclusion Criteria consists of patients between age group of 16-45years, of male and female patients, who gave informed consent and were cooperative and received minimum primary education, who were either drug naive or at least 1 month off any psychotropic medication. Exclusion criteria included history of Head trauma, substance use disorders, chronic medical and surgical illness, and/or received electroconvulsive therapy (ECT) in the last 6 months.

Study sample of schizophrenia patients were evaluated on semi-structured clinical proforma for sociodemographic variables, the I.C.D. 10 classification of mental and behavioural disorders, to confirm the diagnosis, Positive and Negative syndrome scale (PANSS), P.G.I Battery of brain dysfunction (PGIBBD) to access cognitive deficit.[12,13]

The data obtained has been analysed by Pearson's correlation and Correlation coefficient and From coefficient of determination. Appropriate statistical diagrams i.e. scatter diagrams were drawn with correlation curves.

OBSERVATIONS

Table 1. Sample Characteristics of Schizophrenic Patients

Profile	Variable	N = 40 schizophrenia patients
Age	16yrs- 25yrs	10(25%)
	26yrs-35yrs	17(42.5%)
	36yrs-45yrs	13(32.5%)
Gender	Male	25(62.5%)
	Female	15(37.5%)
Duration of illness	0-12 mths	8(20%)
	13-24 mths	6(15%)
	25-36 mths	4(10%)
	37-48 mths	2(5%)
	>49 mths	20(50%)
Subtype of schizophrenia on PANSS Scores	Positive	36(90%)
	Negative	4(10%)

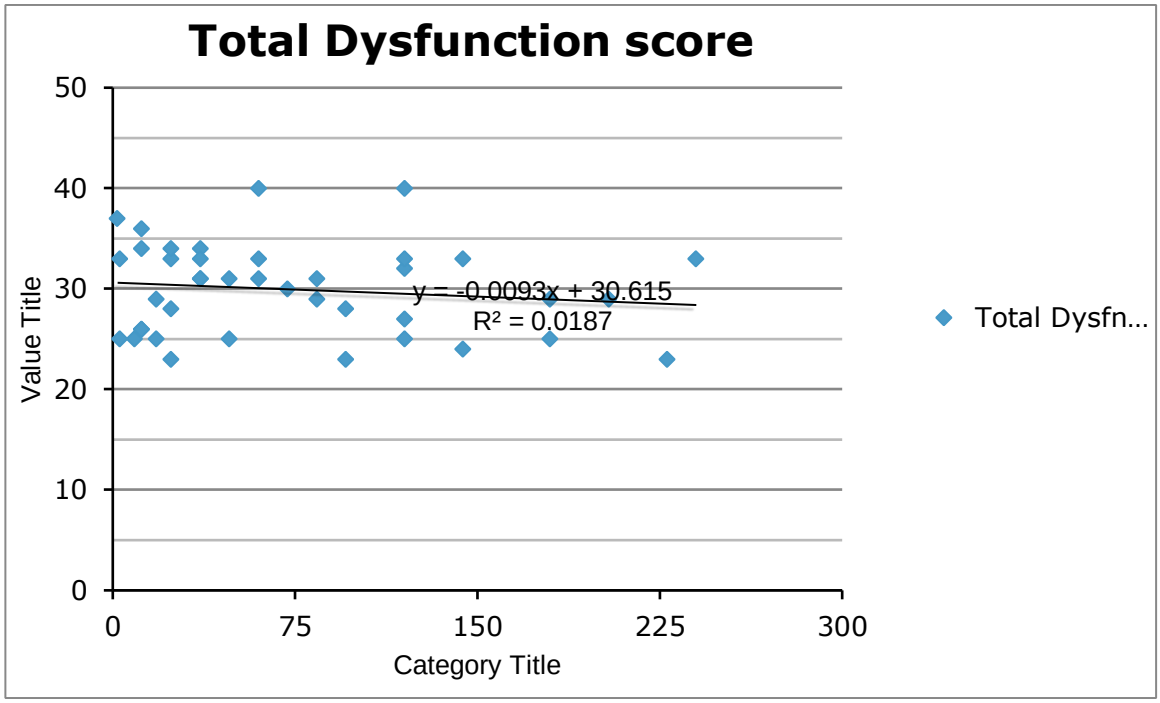
Table 2. Prevalence of Cognitive Dysfunction in Schizophrenic Patients according to PGI battery of Brain Dysfunction

PGI battery of brain dysfunction score	N=40
0-19 No impairment	0 (0%)
20-38 Slight impairment	38 (95%)
39-57 Great impairment	2 (5%)

Table 3. CORRELATION BETWEEN COGNITIVE DYSFUNCTION DOMAINS AND DURATION OF ILLNESS

S. No.	Subtest of memory scale (Cognitive Domain)	Mean and standered Daviation	Correlation Coefficient (R, Pearson's)	95% Confidence Interval	Coefficient of determination (r squared)	Two Tailed P-Value (significant if <0.05)
1.	Remote memory	0.33	-0.1493	-0.4404 to 0.1702	0.02228	0.3580
2.	Recent memory	1.03	0.04311	-0.2721 to 0.3500	0.001858	0.7917
3.	Mental balance	1.10	-0.1816	-0.4668 to 0.1377	0.03299	0.2620
4.	Attention and concentration		-0.08692	-0.3880 to 0.2309	0.007555	0.5938
5.	Delayed recall	1.06	0.09843	-0.2199 to 0.3978	0.009689	0.5457
6.	Immediate recall	1.18	-0.056	-0.4933 to	0.0032	0.7294

				0.1039		
7.	Retention of similar pair	0.8	-0.2147	-0.4933 to 0.1039	0.04609	0.1834,
8.	Retention of dissimilar pair	0.45	-0.1229	-0.4184 to 0.1962	0.01510	0.4500,
9.	Visual retention	1.36	-0.09311	-0.3933 to 0.2250	0.008670	0.5677
10.	Performance Quotient(PQ)	0.97	-0.04269	-0.3496 to 0.2725	0.001823	0.7937
11.	T.Q.(Total quotient) on information	0.533	0.1819	-0.1375 to 0.4670	0.03309	0.2613
12.	T.Q. on Digit Span	0.53	0.008	-0.0028 to 0.0584	0.000064	0.9622
13.	T.Q. on Arithmetic	1.07	-0.2609	-0.5295 to 0.05515	0.06808	0.1039
14.	T.Q. on Comprehension	0.56	-0.09013	-0.3907 to 0.2279	0.008123	0.5802
15.	Naher Benson Test	1.02	0.1009	-0.2176 to 0.3999	0.01017	0.5357
16.	Bender Gestalt Test	0.5	0.02461	-0.2892 to 0.3336	0.0006058	0.8802



Graph 1. Correlation between "Duration of illness" and 'Total Cognitive Dysfunction score"

Table 4. Distribution of Mean Dysfunction Score on different Cognitive Parameters in Positive and Negative subtype of Schizophrenia

Schizophrenia (n = 40)	Positive subtype (n=36) (mean dysfunction score)	Negative subtype (n=4) (mean dysfunction score)
Remote memory	2.08	2.5
Recent memory	0.66	2
Mental balance	2.94	3
Attention and concentration	2.94	3
Delayed recall	2.86	3
Immediate recall	1.62	2
Retention of similar pairs	1.86	2.25
Retention of dissimilar pairs	2.75	2.5

Visual retention	1.80	1.5
Recognition	2.41	2.75
Performance Quotient	1.61	2.25
T.Q. on information	0.166	0
T.Q. on Digit Span	0.166	0
T.Q. on Arithmetic	0.66	0.75
T.Q. on Comprehension	0.138	0
Nahor Benson test	0.75	1.0
Bender Gestalt test	2.55	2.75
Total Dysfunction score	29.4	34.5

RESULTS

Table 1, shows characteristics of sample population, out of 40 Schizophrenic patients, 10 belong to age group from 16-25years, 17 from 26-35years and 13 belong to 36-45years. Twenty five were male and fifteen were female. Half of patients had schizophrenia for more than four years. Ninety percent of study population belonged to positive symptoms Schizophrenia. According to table 2, all 40 patients had cognitive dysfunction when measured on PGIBBD. The average dysfunction rating score in remote memory, recent memory, mental balance, attention and concentration, immediate recall, delayed recall was 2.125, 0.8, 2.95, 2.95, 1.125, and 2.87 respectively. In retention of similar pair and dissimilar pair and visual retension mean rating score was 1.9, 2.72 and 1.77. In the performance quotient, average dysfunction rating score was 1.675. In verbal intelligence parameters, average dysfunction rating scores of Task Quotient (T.Q.) on arithmetic was 0.675, T.Q. digit span was 0.15, T.Q. information was 0.15 and T.Q. comprehension was 0.125. In visuo-motor task, average dysfunction rating score in Nahor Benson test and Bender Gestalt test was 0.775 and 2.575 according to table 3. In this study we aimed at finding the correlation between cognitive dysfunction rating scores with the total duration of schizophrenic illness, dysfunction scores were plotted on y-axis with duration on x-axis. By means of appropriate statistical analysis and scatter diagrams, we found that although there was a "negative correlation" ("r" =- 0.1367), but this correlation was not statistically significance. ("p" value = 0.4001). Our study sample was also subdivided according to PANSS score, 36 were of positive and 4 were of negative subtype. In negative subtype of schizophrenia more dysfunction was found. This finding cannot be generalized because the numbers of patients with negative subtype of schizophrenia were very few.

DISCUSSION

"My whole mental power has disappeared, I have sunk intellectually below the level of a beast" (a patient with schizophrenia, quoted by Kraepelin, 1919).[14]Traditionally, significant cognitive impairment was thought to be evident only in elderly deteriorated patients with schizophrenia. However, over the past 25 years, evidence has accrued to challenge this view. It is becoming evident that marked cognitive impairment is, in fact, the norm and often pre-dates the illness. There have been numerous studies done so far in these areas finding prevalence of cognitive dysfunction in schizophrenia. Recent analysis was done by Keefe et al. from 150 patients with schizophrenia suggest that up to 98% of patients perform more poorly on cognitive tests than would be predicted by their parents' educational level.[15] The domains that are most consistently cited as being severely impaired in schizophrenia are verbal memory, executive functions, attention or vigilance, verbal fluency, and motor speed.[16] Deficits in social cognition also appear to be severe, but this is a relatively new area of research with fewer studies to support this finding.[17]

In our study group we found impairment in all the parameters of memory. According to Indian study done by Srivastava et al.2004[18] using the PGIBBD scale, found impairment in all parameters of memory like remote memory, recent memory, mental balance, attention and concentration, immediate recall, delayed recall, similar pair, dissimilar pair and visual retention. On the other hand Harvey and Keefe 1997 found almost no impairment in long-term factual memory.[16] Attention impairment is likely to be a marker of biological liability to schizophrenia, as individuals with vulnerability to this disorder display deficits in attention long before the appearance of other symptoms. These deficits also function as good discussion predictors of the later developing schizophrenia in children with high risk of the disorder.[19] Individuals suffering from schizophrenia display a broad array of attention impairments, irrespectively of their clinical state.[20] Krishnadas et al.2007 also found impairment in retention of similar pair and dissimilar pair.[21] Several similar studies, found impairment in visual retention.[18, 22,21]

We also found the impairment in performance quotient, verbal intelligence, Task Quotient (TQ) on arithmetic, TQ digit span, TQ information and TQ comprehension, TQ on arithmetic in patients of schizophrenia. Weickert and colleagues (2000) also found a general intellectual decline of 10 points or more from pre-morbid level in 51% in sample of consecutively admitted patients.[23] Earlier studies [18,16] and our study are also evident of visuomotor skill impairment in Schizophrenic patients.

Regarding the course of neurocognitive impairment in schizophrenia, one view suggests that cognitive

deficits become progressively worse throughout the long duration of the illness. A second view suggests that cognitive deficits, once they arise, remain relatively stable; this view is thus consistent with the notion of a static encephalopathy.

We came out with non significant correlation between duration of illness and cognitive dysfunction. There have been many similar cross sectional studies but they did not come out with positive correlation.[24,25,26] Goldstein et al. found no differences in performance on the complex cognitive tasks on the Halstead Reitan Battery between large samples of younger and older patients with chronic schizophrenia.[27] Heaton et al. demonstrated that a large sample of older schizophrenic outpatients did not manifest deterioration in performance above and beyond that of normal aging.[28,29] On the contrary, that after an insidious onset, patients' intellectual functions become weaker and social skills become coarser.Similarly, greater cognitive impairment reported in chronic patients compared with first-episode patients.[30,31]

Definitive answers to questions regarding possible progression of cognitive impairment in schizophrenia must come from longitudinal studies. Rund 1998has reviewed a number of longitudinal studies and concluded that the cognitive deficits appear to be relatively stable in schizophrenia, consistent with a static encephalopathy rather than a degenerative process.[5] Our study sample was also subdivided according to PANSS score, 36 were of positive and 4 were of negative subtype. In negative subtype of schizophrenia more dysfunction was found in almost all cognitive domains compared to positive subtype. This finding cannot be generalized because the numbers of patients with negative subtype of schizophrenia were very few.

Tijana Cvetic and Olivera Vukovic (2006) also found that the negative subtype of schizophrenia showed significantly higher cognitive dysfunction like the selection of information, processing, planning, comprehension, realization (executive functions) as well as visual motor abilities.[32] On the other hand cognitive dysfunction is significantly correlated with various types of negative symptoms.[33,34,35,36,37,16]

LIMITATIONS

The sample taken was small. A large sample would have been more representative. Age at onset of psychosis was not considered, this could have an impact on outcome of study. There was no control population taken for comparison. Being a cross sectional study design, to calculate a longitudinal (length) related parameter's impact on cognition is itself a great limitation of study, because of methodological difficulties, short follow up period. We have not taken into account details of treatment taken by our study group; this could have been a separate research protocol, because there is still some convincing evidence in literature that some psychotropic agents may improve cognition.

CONCLUSION

Impairment of cognition in Schizophrenia is one of the core manifestations of the illness and it is not dependent on the duration of illness. Once the cognitive dysfunction occurs in the first episode, it remains as a stable and enduring feature of illness, irrespective of treatment taken. But to substantiate our finding, larger and prospective studies required.

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