INTERNATIONAL JOURNAL OF ADVANCE RESEARCH AND DEVELOPMENT

(Volume3, Issue5)

Available online at: www.ijarnd.com

Cognitive dysfunction in early onset and late onset schizophrenia and psychopathology: A clinical and outcome study

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ABSTRACT

The current study aim was first, to examine early and late-onset schizophrenia Performances on Brief Psychiatric Rating Scale (BPRS) subtest. Methods: The study was conducted at Ranchi Institute of Neuro- Psychiatry and Allied Sciences (RINPAS), Kanke, Ranchi. Based on purposive sampling method a group of forty male schizophrenic patients between the age range of 18 to 42 years was taken twenty patients were early-onset schizophrenia (18 to 30 years) and twenty patients were of late onset of schizophrenia (31 to 42) years who were diagnosed according to the DCR, ICD – 10 were selected from different words of RINPAS. Similarly, twenty normal controls were selected from different localities of Ranchi. Results: Significant result found on different domains of BPRS. Between the schizophrenics groups, the late onset schizophrenics performance was more symptomatic than early onset schizophrenics patient on all parameters of the test. The performance of normal on controls group was better than schizophrenic groups.

Keywords: *Early onset schizophrenia, Late-onset schizophrenia, Cognition, and Psychopathology.*

1. INTRODUCTION

Cognition is a high level of mental process by which we understand the world process information, make Judgment and decisions, and communicate knowledge to others. Cognition refers to the process whereby individual acquire knowledge of the highest level of various mental processes such as perception, memory, abstract thinking, reassuring and problem-solving as well as the more integrative and central processes relate, to executive functions such as planning, choosing strategies, set shifting and the enactment of these strategies.

There are few processes which come under the domain of cognition. Attention is a process that enables an individual to focus on the relevant information in a stimulus away while also inhibition further processing of non-relevant information (Rothboart, Posher & Hershey 1995). Attention is a prerequisite for the successful performance of more complex cognitive process; perception is a central step in the processing of sensory information perceived through sensory systems is later transformed into higher order codes for use by the various higher order cognitive subsystems. Perceptual functions include activities such as awareness, recognition, discrimination, and orientation (Lezak 1995).

Higher order cognitive functions are related to frontal lobes. When lesion occurs in the frontal lobe, it manifests itself in several ways. Cognitive impairment will cause impairment to assuring a mental set shift relatively from one aspect of the situation to another, to detach own ego from the outer world or from inner experiences, to hold in mind simultaneously various aspects, to grasp the essential of a given whole, to break up a given whole into parts, to isolate and to synthesize them, to abstract properties respectively.

Recognition of the potential importance of cognitive dysfunction in schizophrenia dates back to Kraeplin when he first described Dementia Precox 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).

Over the middle of the 20th century influenced by the advent of medications that effectively treat most of the symptoms of schizophrenia other than deficits in format cognitive function the focus of attention on schizophrenia shifted away from cognition and towards positive symptoms of the illness. At the very end of 20th century, however, 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. Another impetus toward the increased interest in cognition in schizophrenia was the realization that some of the newer medications used to treat schizophrenia had beneficial effects on cognition as well. Finally, the level of sophistication in the diagnosis and sub type of schizophrenia increased as well leading to greater reliability of findings and faster progress in understanding some of the subtleties of cognitive impairments.

The evidence has long been clear that schizophrenia is a disorder of the brain with genetic and Neurodevelopment components, yet the precise nature of the brain pathology and genetic vulnerability remain unknown. In addition, there is remarkable heterogeneity among schizophrenia presentation, everyday functioning, treatment response, and course of illness. Indeed, in coining the modern term for this disorder, Eugen Bleuler spoke not of "Schizophrenia" such heterogeneity has led some to suggest that the term schizophrenia has itself outlived its usefulness (Howard, 1996). A more common approach has been to divide schizophrenia into subtypes. Attempts to devise a meaningful subtype's scheme are as old as the concept of schizophrenia itself. Kraepelin initially divided the disorder the disorder into hebephrenic, catatonic, and paranoid forms, and later, impart inspired by E. Bleular, he proposed an even more complex subtyping scheme. E. Bleuler (1911) proposed four major grouping based on symptoms (hebephrenia, catatonia, paranoid, and schizophrenia simplex) but also suggested the possibility of groupings based on periodicity etiology, severity of symptoms and perhaps most important age at onset.

2. HISTORICAL DEVELOPMENT OF THE CONCEPT

Early Onset Schizophrenia

Three-fourth of all schizophrenias begins with a prepsychoticprodromal phase, which lasts several times longer than the psychotic prophase. 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 perhaps 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 outcome of social disability.

Late-Onset Schizophrenia

The late onset schizophrenia although not a formal diagnostic category separate from regular schizophrenia, is intended to refer to those patients who meet the diagnostic criteria for schizophrenia but where clinical symptoms first emerged in middle age or late age.

An implicit hypothesis of those who assert that late-onset schizophrenia cannot be "true schizophrenia" because it is presumed to lack neurodevelopment origins is the notion that late-onset schizophrenia reflects more recently acquired or emergent neuropathology. Certainly, behavioral changes ultimately reflect parallel changes in the brain, so on some level, the onset of psychosis in any schizophrenia patient must be associated with some parallel changes in brain activity. However, there is no consistent evidence for recently emergent neuropathology in late-onset schizophrenia patient.

Studies of late-onset schizophrenia began with Manfred Bleuler, who personally examined 126 patients whose illness began after the age of 40 years. These late-onset cases constituted 15% of the schizophrenia patients he examined 4% of the patients had an onset after 60. About 50% of the patients with late-onset schizophrenia had symptoms that were indistinguishable from those seen in schizophrenic patients with the more typical younger age at onset. Bleuler's age cutoff of 40 years influenced the German literature. Subsequent reports in the English literature used either 55 or 60 years of age as the dividing line and adopted the term "late paraphrenia" to both distinguish the illness from chronic schizophrenia and emphasize its clinical similarities with the condition described by Kraepelin. This was an unfortunate choice, however, since Kraepelin had never regarded late age at, onset as a feature of paraphrenia. Moreover, the concept of paraphrenia – experiencing hallucinations and delusions without deterioration or disturbance of affective response, this distinguishing the disorder form of dementia praecox had been discredited. Driven by the early emergence in Europe of geriatric psychiatry as a distinct subspecialty, as well as the apparent syndromic coherence of late paraphrenia, including female preponderance, abnormal premorbid personality and social functioning and deafness, the late paraphrenia concept was readily adopted and included in ICD – 9.

3. SIGNIFICANCE OF THE STUDY

This research is more significant for managing the patients with the help of these tests one can analyze the severity of the cognitive dysfunctions and Psychopathology among early-onset schizophrenics patients and late-onset schizophrenics patients and this evaluation paves the way to the management of such patient.

Limited research has been conducted on the population of early-onset schizophrenics and late-onset schizophrenic and Significant of Psychology.

Venue of study:

The study has been conducted at Ranchi Institute of Neuro Psychiatry and Allied Sciences (RINPAS), Kanke, Ranchi.

Statement of the Problem: The statement of the problem is cognitive dysfunction among early-onset schizophrenics, late-onset schizophrenics, and psychopathology.

4. SAMPLE

Based on purposive sampling method a group of forty male schizophrenic patients between the age ranges of 18 to 42 years were taken in the present study. Twenty patients were of early-onset schizophrenia (18 to 30 years) and twenty patients were of late onset of schizophrenia (31 to 42 years) Patients were diagnosed according to the DCR, ICD – 10 and have been selected from different words of RINPAS. Similarly, twenty normal controls were selected from different localities of Ranchi.

Normal Control (Group 'A')

A control group of twenty normal individuals has been included in the study. The subjects who had no history of alcohol or other substance abuse were taken for the study. Normal controls were selected from RINPAS staff and local residents of Kanke and Ranchi, who were matched in terms of age, education, and handedness etc. General Heath Questionnaire (GHQ – 12) has been administered to them. Informed consent was taken from all the participant of the study. Criteria for the exclusion of the subjects were similar to that of the experimental groups.

Inclusion Criteria for Early Onset Schizophrenics (Group 'B'):

Following inclusion criteria have been adopted for early onset schizophrenics

- Patient diagnosed with Schizophrenia according to DCR, ICD – 10.
- Male Patient.
- Right Handed.
- Patient in the age range 18 to 30 years (early onset).
- Educated at least up to primary level.
- Duration of illness at least two years.
- Patient-cooperative for testing.

Exclusion Criteria for Early Onset Schizophrenics (Group 'B'):

Following exclusion criteria have been adopted for early onset schizophrenics.

- History of any other Psychiatric disorder or personality disorder.
- History of head injury or another organ city, substance abuse, mental or retardation.
- Poor eye sight or hearing impairment.
- Patients who are not able to cooperate.

Inclusion Criteria for Late-Onset Schizophrenics (Group 'C'):

In this present study following inclusion criteria have been adopted

- Patient diagnosed with Schizophrenia according to DCR, ICD – 10.
- Male Patient.
- Right Handed.
- Patient in the age range 31 to 42 years (late onset).
- Educated at least up to primary level.
- Duration of illness at least two years.
- Patients who are cooperative.

Exclusion Criteria for Late-Onset Schizophrenics (Group 'C'):

In this present study following exclusion criteria have been adopted

- History of any other psychiatric disorder or personality disorder.
- History of brain injury or other organ city or history of substance abuse or mental retardation.
- Poor eye sight or hearing impairment.
- Patients who are not able to cooperate.

5. TOOLS FOR THE ASSESSMENTS

The following tools have been administered in the present study.

- Socio-demographic and clinical data sheet

- Handedness preference schedule (Manual et al 1992)
- Brief Psychiatric Rating Scale (BPRS)

Socio-Demographic and clinical data sheet:

A semi-structured Performa has been used for recording details about the patients such as age, education, marital status, occupation, the age of onset of illness etc.

Handedness preference schedule (Mandal et al 1992):

To determine the handedness of the subject Hindi version of handedness preference schedule was used. The items included in the schedule are 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).

Brief Psychiatric Rating Scale (Overall and Gorham 1988):

This scale consists of an interview schedule, symptoms definitions and scientific anchor points for rating symptoms or Psychopathology. It was originally developed by John overall and Donald Gorham in 1963 and has been modified by them and others over the years. The original BPRS was developed following a factor analysis of the In-patient Multidimensional Psychiatric Scale (IMPS), which has been developed by Muarice Lorr and C. James Klett.

The form or scale of BPRS was developed by David Lukoff, Keith H. Nuechterlein, and Joseph Ventura. In this scale, there are total 24 items. The rating for items 1 to 10 and 19 – 22 are based on patient's answers to the interviewer's questions. The time frame for these items is the past two weeks. Items 11, 18, 23 and 24 are based on patient's behavior during the interview and the time frame covered in the interview period only. The rating of the scale varies from 1 to 7 ratings of 2 – 3 indicates non – pathological intensity of a symptom whereas a rating of 4 – 7 indicate a pathological intensity of that symptoms.

6. PROCEDURE

Subjects of the schizophrenic groups were selected from different wards and the OPD of Ranchi Institute of Neuro – Psychiatry and Allied Sciences, Kanke, Ranchi. Semi-structured clinical data sheet was used. BPRS was used to assess the severity of the psychotic symptoms.

Statistical Analysis:

The data obtained have been analyzed by using the computer software program, Statistical Package for Social Sciences version 13.0 (SPSS – 16.0), ANOVA (F) test have been used to compare the performance on cognitive functions among three groups. χ^2 and' test was also used to compare the socio-demographic details of the three groups.

Table 1.a.: Socio – Demographic Profile of Normal control (20) early onset (20) and late onset (20)

Variable		Normal Group mean ± SD/n(%)	Early Onset Schizophrenia mean ± SD/n (%)	Late Onset Schizophrenia mean ± SD/n (%)	χ^2 / F	do	Level of significance
Age		**27.40±6.93**	**27.85±3.06**	**39.10±4.17**	**35.20**	**-**	**NS**
Marital Status	Unmarried Married	13 (65) 7 (35)	8(40) 12(60)	5(25) 15(7)	6.65*	2	0.05
Education	Up to Metric Above Metric	6 (30) 14 (70)	15(75) 5(25)	14(70) 6(30)	46.58***	4	0.001
Occupation	Unemployed Semi-skilled Skilled	3(15) 11(55) 6(30)	1(5) 15(75) 4(20)	1(10) 12(60) 6(30)	20.00**	6	0.01
Domicile	Rural	2(10)	15(75)	13(65)	33.51***	4	0.001

	Semi Urban Urban	1(5) 17(85)	4(20) 1(5)	4(20) 3(15)			
SES	LSES MSES HSES	3(15) 16(80) 1(5)	16(80) 3(15) 1(5)	15(75) 5(25) ---	22.48***	4	0.001

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

It is clear from Table 1.a. which gives descriptive information about the socio-demographic characteristics of the entire sample, which was divided into three groups – Normal control, early onset schizophrenia and late-onset schizophrenia. The mean age of normal controls, early onset, and late-onset were 27.40 ± 6.93, 27.85 ± 3.06 and 39.10 ± 4.17 respectively. It is clear from the table that there is no significant difference between three groups, regarding their age. Though, there are marked the mean difference between the age of early onset and late onset of schizophrenics. Late onsets of schizophrenics were older than that of early onset of schizophrenics.

When the marital status of the subjects has been taken into account. It has been observed that sixty-five percent normal subjects were unmarried who may be due to their cultured background of the urban area. Thirty-five percent of normal controls subjects were married. In the group of early onset of schizophrenics, only forty percent of the patients were unmarried and sixty percent of the patients were married. Only twenty-five percent of late onset of schizophrenics was unmarried and seventy-five percent of these patients were married.

When education of the subjects has been taken into consideration. It has been observed that thirty percent normal subjects were educated up to metric, and seventy percent of normal controls subjects were educated above metric. In the group of early onset of schizophrenics, seventy-five percent of the patients were educated up to metric and twenty-five percent of the patient was educated above metric, which may be due to their illness. In the group of late-onset schizophrenics, seventy percent of the patient was up to metric and thirty percent of the patient was above metric.

When the occupation of the subjects have been taken into account, it has been observed that normal group had a higher representation in employed groups and schizophrenic patient both (Early onset ad Late-onset) had a higher representation in the unemployed group. The probable reason may be their enduring illness, frequent hospitalizations, which might have affected their stability in working area.

When domicile of the subjects have been taken into consideration it has been observed that eighty-five percent normal subjects were belonging to an urban area and ten percent to a rural area. In the group of early onset of schizophrenics, seventy-five percent of the patients were belonging to a rural area and five percent of the patient was from the urban area. In the group of late onset of schizophrenics, sixty-five percent belong to the rural background and fifteen percent had urban background.

All the three groups were matched on socio – economic status. Both the schizophrenic groups belong mostly to lower socio – economic status. A possible reason may be that such patients commonly come to the tertiary referral center.

Table 1.b.: Group comparison of clinical characteristic (N = 40)

Variable	Early Onset Schizophrenia Mean ± SD	Late-Onset Schizophrenia Mean ± SD	't' value	Level of significance
Age of onset of illness	24.10 ± 4.56	32.90 ± 8.57	18.16*	0.001
BPRS	22.35 ± 3.93	23.50 ± 4.82	1.54	NS

* P < 0.05

Table 1.b. gives a summary of the group differences in the sub – groups of schizophrenia on various clinical variables. The mean age of onset of illness in Early Onset Schizophrenia and Late-Onset Schizophrenia were 24.10 ± 4.56 and 32.90 ± 8.57 respectively.

The differences between the two groups were significant at 0.05 levels. However, there was no significant difference between these two groups.

it has been observed that normal control subjects have better on all domains of BPRS. Schizophrenic patients on a different test of BPRS indicates that late-onset schizophrenic patients have significantly more psychopathology in comparison to early onset schizophrenic and normal control subjects.

7. LIMITATION OF STUDY

- The sample size was small.
- The study was limited to male schizophrenic population, no female subjects were included.
- Medication effect on cognitive functioning was not controlled.
- A larger sample can be used in future studies to generalize the result.
- Female subjects may be included in the sample.
- A closer examination between BPRS subscales and neuropsychological variables might be a focus of future research.
- Other neuropsychological tests may be incorporated in the study for more elaborate assessment of cognitive functions.

8. REFERENCES

[1] Addington, J., & Addington, D., (2000) Neurocognitive and social functioning in schizophrenia: a 2.5 year follow-up study. Schizophrenia Research, 44, 47-56.
[2] Barcelo, F., Sanz, M., Molina, V., Rubia, F.J., (1997) The Wisconsin Card Sorting Test and the assessment of frontal function: A validation study with event-related potentials. Neuropsychological 35: 399-408.
[3] Bassett, A.S., Bury, A., & Homer, W.G., (1994) Testing Liddle's three – syndrome model in families with schizophrenia. Schizophrenia Research 12:213-221.
[4] Berman, H., Viegner, B., Amalia, M., Allan, E., et al (1997) Differential relationship between positive and negative symptoms and neuropsychological deficits in schizophrenia. Schizophrenia Research 25:1-10.
[5] Blanchard, J.J., & Neale, J.M., (1994) the neuropsychological signature of schizophrenia: generalized or differential deficit? American Journal of Psychiatry 151, 40-48.
[6] Bleuler, E., Dementia Praecox, or the Group of Schizophrenia (1911). Translated by Zinken J. New York, International Universities Press, 1950.
[7] Bleuler, M., Die (1943) spatschizophrenen Krankheitsbilder, Fortschritte der Neurologie and Psychiatre 15:259-290.
[8] Bornstein, RM., Leason, M.. (1985) Effects of localized lesions on the verbal concept attainment test. Journal of Clinical and Experimental Neuropsychology. 7: 421-429.
[9] Braff, D.L., Heaton, R.K., Kuck, J., Cullum, M., Moranville, J., Grant, I., Zisook, S., (1991) The generalized pattern of neuropsychological deficits in outpatient with chronic schizophrenia with heterogeneous Wisconsin Card Sorting Test Results. Archives of General Psychiatry. 48: 891-898.
[10] Corey-Bloom, J., Jernigan, T., Archibald, S., et al (1995) Quantitative magnetic resonance imaging of the brain in late-life schizophrenia. Am J psychiatry 152:447-449.
[11] Crow, T. J., MacMillan, J. F., Johnson, A. L., & Johnstone, E. C., (1986) A randomized controlled trial of prophylactic neuropletic treatment. Brit, J. Psychiatry 148: 120-127.
[12] Dieci, M., Vita, A., Silenzi, C., Caputo., (1997) A Non- selective Impairment of Wisconsin Card Sorting Test performance in patients with schizophrenia. 25: 33-42.
[13] Drewe, E. A., (1974) The effect of type and area of brain lesion on Wisconsin Card Sorting Test Performance. Cortex 10: 159-170.
[14] Egan, M. F., Goldberg, et al (2001). Relative risk for cognitive impairments in siblings of patients with schizophrenia. Biological Psychiatry 50, 98-107.
[15] Eggers, C., & Bunk, D., (1997) The long-term course of childhood-onset schizophrenia; a 42-year followup. Schizophrenia Bulletin, 23, 105-117.
[16] Franke, P., Maier, W., Hain, C., & Klingler, T., (1992). Wisconsin Card Sorting Test: an indicator of vulnerability to schizophrenia? Schizophrenia Research 6. 243-249.
[17] Frith, C., (1996) Neuropsychology of schizophrenia: what are the implication of intellectual and experiential abnormalities for the schizophrenia, British Medical Bulletin 52, 618-626.
[18] Fuller, R., Nopoulos, P., Arndt, S., et al (2002) Longitudinal assessment of premorbid cognitive functioning in patient with schizophrenia through examination of standard scholastic test performance. American Journal of Psychiatry, 159, 1183-1189.
[19] Galdos, P., & Os, van J. (1995) Gender, psychopathology, and development: from puberty to early adulthood. Schizophrenia Res. 14: 105-112.
[20] Glahn, D., Therman, S., Manninen, M., et al (2003) Spatial working memory as an endophenotype for schizophrenia. Biological Psychiatry 53, 624-626.
[21] Goldberg, T. E., Gold, J.M., Greenberg, R., Griffin, S., Schulz, S.C., Picker, D., Kleinman, J.E.(1993) Contrasts between patients with affective disorders and patients with schizophrenia on a neuropsychological test batter. Am J Psychiatry: 150 :1355-1362.
[22] Goldberg, T., Hyde, T., Kleinman, J., et al (1993) Course of schizophrenia: neuropsychological evidence for a static encephalopathy. Schizophrenia Bulletin, 19. 797-804.
[23] Goldstein, G.. (2000) Cognitive heterogeneity in psychopathology: the case of schizophrenia. In: Veron PA(Ed.). The Neuropsychology of individual differences. San Diego: Academic Press 1994. In: Sharma T and Harvey P. (Eds.). Cognition in Schizophrenia – Impairments, Importance and treatment strategies. United Kingdom: Oxford University Press.

[24] Goldstein, K., Brain, (1943) concussion : Evaluation of the after effects by special tests. Disease of the Nervous System 4: 3-12.
[25] Granholm, E., Morris, S, K., Sarkin, A.J., (1997). Papillary responses index overload of working memory resources in schizophrenia. Journal of Abnormal Psychology. 106: 458-467.
[26] Green, M. F., (1998) Schizophrenia From a Neurocognitive Perspective: Probing the Impenetrable Darkness. Boston, MA, Allyn & Bacon.
[27] Green, M.F., (2000) Schizophrenia from a neurocognitive perspective: Probing the impenetrable darkness. Boston: Allyn and Bacon 1998. in: Sharma, T., and Harvey, P.. (Eds). Cognition is Schizophrenia – Impairments, importance and treatment strategies. United Kingdom: Oxford University Press.
[28] Gunnell, D., Hariison, G., Rasmussen, F., et al (2002) Associations between premorbid intellectual performance, early life-exposures and early-onset schizophrenia. Cohort study. British Journal of Psychiatry, 181, 298-305.
[29] Hafner, H., Behrens, S., Vry, J., de & Gattaz, W.F. (1992 a) An animal model for the effects of estradiol on dopamine-mediated behavior: Implications for sex differences in schizophrenia. Psychiatry Res. 38: 125-134.
[30] Hafner, H., Riecher-Rossler, et al (2001) First onset and early ymptomatology of schizophrenia. Eur. Arch. Psychiatry Clin. Neurosci.fs 24 D 242:109-118.
[31] Haggard, Patrick, (2005) Conscious intension and motor-cognitive trends in cognitive science, Archives of Journal Psychiatry. Vol. 9(6), 290-295.
[32] Heaton, R. K., (1981) Wisconsin card sorting Test Manual, Odessa, Psychological Assessment Resources.
[33] Heinrichs, R. W., & Zakzanis, K. K., (1998) Neurocognitive deficit in schizophrenia : a quantitative review of the evidence. Neuropsychology 12, 426-445.
[34] Hoff, A. L., Sakuma, M., Wieneke, M., et al (1999) Longitudinal neuropsychological follow-up study of patients with first-episode schizophrenia. American Journal of Psychiatry, 156:1336-1341.
[35] Howard, R., Cox, T., el al (1995) White matter abnormalities in the brains of
[36] Kraeplin, E., Damentia, Praecox, and Paraphrenia, (2000)Sharma T and Harvey P. (Eds.). Cognition in Schizophrenia – Impairments, importance and treatment strategies. United Kingdom: Oxford University Press.
[37] Kremen, W.S., Buka, S., Seidman, L, J., et al (1998). IQ decline during childhood and adult psychotic symptoms in a community sample: a 19-year longitudinal study. American Journal of Psychiatry, 155, 672-677.
[38] Lohr, J. B., Alder, M., Flynn., K., et al (1997) Minor physical anomalies in older patients with late-onset schizophrenia, early onset schizophrenia, depression, and Alzheimer's disease. Am J Geriatr Psychiatry 5:318-323.
[39] Luria, A. R., (1966) The Higher Cortical Functions in man. New York, Basic.
[40] Mandal, K. M., Pandey, G., Singh, K. S., et al (1992) Hand preference in India. International Journal of Psychology 27: 433-442.
[41] Mekenna, P. J., Tamlyn, D., Lund, C. E., Mortimer, A . M., Hammond, S., & Baddeley, A.. D., (1990). Amnesic syndrome in schizophrenia. Psychological Medicine 20, 967-972.
[42] Milner, B., (1969) Effects of different brain lesions on card sorting. Archives of Neurology 9: 90-100.
[43] Mohamed, S., Paulsen, J. S., O" Leary, D., Arndt, S., & Andreasen, N., (1999) Generalized cognitive deficits in schizophrenia: a study of first-episode patients. Archives of General Psychiatry 56,749-754.
[44] Morice, R., (1990) Cognitive inflexibility and pre-frontal dysfunction in schizophrenia and mania. B J Psychiatry157 : 50-54.
[45] Mundal, M. K., Pandey, R., & Prasad, A. B., (1998) Facial expression of emotions and schizophrenia: a review Schizophrenia Bulletin, 24, 399-412.
[46] Nelson, H., & O'connell, A., (1978) Dementia: the estimation of pre-morbid intelligence levels using the new adult reading test. Cortex, 14, 234-244.
[47] Parellada, (1994) Regional cerebral blood flow changes in prefrontal in prefrontal area. Psychiatric Research 55: 131 – 139.
[48] Pershad, D., and Verma, S. K., (1998) Translation and adaptation of WAIS-R verbal scale in Hindi in the concept and assessment of intelligence. National Psychological Corporation, Agra.
[49] Pope, H. G, Lipinski, J. D., (1978) Diagnosis in schizophrenia and manicdepressive illness. Archives of General Psychiatry 35 : 811-828.
[50] Rabinowitz, J., Reichenberg, A., Weiser, M., et al (2000) Cognitive and behavioural functioning in men with schizophrenia both before and shortly after first admission to hospital. Cross-sectional analysis. British Journal of Psychiatry, 177, 26-32.
[51] Ragland, J. D., Censists, D. M., Gur, R. C., Glahn D.C., Gallacher, F., Gur, R. E., (1996) Assessing Declarative memory in schizophrenia using Wisconsin Card Sorting Test stimuli: the Paired Associate Recognition Test. Psychiatry Research 60: 135-145.
[52] Remalinga, Swami, P., (1974). The measurement of intelligence among adult Indians. published in India by MANASAYAN ,New Delhi.
[53] Robinson, A. L., Heaton, R. K., Lehman, RAW, Stilson, D. W., (1980) Utility of the WCST in detecting and localizing frontal lobe lesings. J Cocsulting Clinical Psychology 48: 605-614.
[54] Salame, P., Baddeley A.D., (2000) Effects of background music on phonological short term memory. Quarterly Journal of Experimental Psychology. 1989; 41 : 107 – 122. In: Sharma T and Harvey P. (Eds.). Cognition in Schizophrenia – Impairments, importance and treatment strategies. United Kingdom: Oxford University Press.
[55] Saykin, A. J., Shtasel, D. L., Gur R.E., et al (1994) Neuropsychological deficits in neuroleptic native patients with first episode schizophrenia. Archives of General Psychiatry. 51: 124-131.
[56] Scheupabach, D., Keshavan, M. S., Kmiee, J. A., et al (2002) negative symptom resolution and improvements in specific cognitive deficits after acute treatment in first-episode schizophrenia. Schizophrenia Research, 53:249-261.
[57] Seltzer, J., Conrad, C., Cassens, G., (1994) Neuropsychological profiles in schizophrenia: paranoid versus undifferentiated distinctions. Schizophrenia Research. 27L 131-138.
[58] Silver, H., Shlomo, N., Turner, T., et al (2002) Perception of happy and sad facial expression in chronic schizophrenia: evidence for two evaluative systems. Schizophrenia Research, 55, 171-177.

[59] Stratta, P., Daneluzzo, E., Prosperini, P., Bustini, M., Casacchia, M., Ross A. , (1997) Is Wisconsin Card Sorting Test Performance related to 'working memory' capacity? Schizophrenia Research. 27: 11 – 19.
[60] Stuss, D. T., Levine, B., Alexander, M. P., Hong, J., Palumbo, C., Hamer, L., Murphy, K. J., Izukawa, D., (2000) Wisconsin Card Sorting Test performance in patients with focal frontal and posterior brain damage: effects of lesion location and test structure on separable cognitive processes. Neuropsychological 38: 388-402.
[61] Sullivan, E. V., Mathalon, D. H., Zijpursky, R. B., (1993) Factors of the Wisconsin Card Sorting Test as measures of frontal lobe function in schizophrenia and in chronic alcoholism. Psychiatry Research 46: 175-199.
[62] Taylor, M. A., and Abrams, R., (1984) cognitive impairment in schizophrenia. American Journal of Psychiatry, 141,196-201.
[63] Thompson, P. M., Vidal, C., Giedd, J. N., Gochman, P., Blumenthal, J., Nicolson, R., Toga, A. W., & Rapoport, J. L., (2001) Mapping adolescent brain change reveals dynamic wave of accelerated gray matter loss in very early-onset schizophrenia, Proceedings of National Academy of Sciences of the United States of America 98, 11650-11655.
[64] Wechsler, D., (1981) Wechsler Adult Intelligence Scale-Revised (WAIS-R) Manual. Cleveland, OH: Psychological Corporation/Harcourt Brace Jovanovich.
[65] Weickert, T., Goldberg, T., et al (2000), Cognitive impairment in patient with schizophrenia displaying preserved and compromised intellect. Archives of Journal Psychiatry, 57, 907-913.
[66] Zorilla, et al (2000) A Cognitive deficits in schizophrenia: evidence for a final common pathway disorder. Acta Psychiatrica Scandinavica 97: 351-357.

