

Cross Validity of 22- items and 15- items Screening Tests from LNNB-I on Paranoid Schizophrenic Patients

Susmita Halder¹, Masroor Jahan² and Alka Nizamie³

ABSTRACT:

LNNB is a widely used standardized neuropsychological tool for cognitive assessment. Several attempts have been made to develop screening tool to identify patients who need detail assessment. In previous studies 22- items and 15- items were identified (Jahan, et al. 1999) and were used as screening tools to identify probable cognitive deficits in epileptic patients (Jahan, et al. 2005). Hence, present study has been conducted with the aim of assessing the cross validity of twenty-two and fifteen items screening tests to detect cognitive deficit in paranoid schizophrenia. Based on purposive sampling technique a sample consisting of 30 male, hospitalized paranoid schizophrenic patients were selected from RINPAS. Appropriate descriptive statistics; mean, SD, and percentage were applied for the analysis of the data. Results suggest that 22- items and 15- items screening tests were able to correctly identify 93% paranoid schizophrenic patients who were having neuropsychological deficits. There was no false negative identification by 22- items and 15- items screening tests. So, it can be used as a screening tool to identify patients who may need detail neuropsychological assessment.

Key Words: LNNB-I, cognitive deficit, screening tool, paranoid schizophrenic patients

INTRODUCTION :

The Luria- Nebraska Neuropsychological Battery (LNNB) (Golden et al., 1985) is a standardized neuropsychological instrument that provides a comprehensive evaluation of sensorimotor, linguistic, academic, memory, and conceptual reasoning ability domain that have proved to be very useful in the objective cognitive assessment of higher cortical function integrity. The LNNB has been used for a variety of assessment purposes. Specific uses include: identifying brain damage in individuals who have symptoms of uncertain etiology; assessing the extent and nature of deficits in clients with known lesions for forensic purposes and to plan appropriate interventions; evaluating the effects of specific intervention or rehabilitation strategies on neuropsychological functioning; examining the effects of various types of brain damage across different populations; and testing theoretical propositions about brain-behavior relationships to confirm, expand, or modify current models of brain function.

A continual question within the psychological and neuropsychological literature has been the discrimination of brain damage from "functional"

disorders such as schizophrenia. With more sophistication, it is recognized that the situation is not all or none; one may be both brain damaged and schizophrenic. Moreover, there is increasing evidence that schizophrenics show signs of structural brain impairment. Purisch et al. (1978) examined the effectiveness of the LNNB in discriminating a chronic schizophrenic population from neurological patients. Puente et al. (1982b) compared 17 non- brain- damaged and 23 brain-damaged schizophrenics on all the original scales and all the items of the battery. The authors found that 109 of the items discriminated between the groups and all 14 scales were able to significantly differentiate the two groups. Faustman et al. (1988) studied the performance of a group of carefully diagnosed, unmedicated, neurologically normal schizophrenics on selected scales of the LNNB-I, the BPRS, and multiple demographic variables. They chose two summary indices from the LNNB-I: the global deficit score and the mean of the C2-C10- C11 scales that are known to be sensitive to cognitive deficit in schizophrenia. Duncan's multiple range test showed that normal subjects perform significantly better than non- paranoid on

1. Ph.D. Scholar, Dept of Clinical Psychology, Ranchi Institute of Neuro-Psychiatry and Allied Science (RINPAS), Ranchi-6
 2. Assistant Prof. in Clinical Psychology, Dept of Clinical Psychology, RINPAS, Ranchi-6. (Reprint Request).
 3. Associate professor in Clinical Psychology, Deepshikha ICD & MD, Ranchi.
- Paper is based on MPhil dissertation of the first author under the supervision of the second author.

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all 11 LNNB clinical scales and significantly better than paranoids on the C4, C6, C7, C9, C10, and C11 scales. In India, Sasi (1989) studied on neurocognitive impairment in positive/ negative schizophrenia, both groups showed impairment in all five scales; motor, tactile, receptive, expressive, and arithmetic scales of LNNB. Negative schizophrenics showed greater cognitive dysfunction compared to positive schizophrenics. Nizamie (1991) studied relationship between clinical and neuropsychological status of schizophrenic patients. Three groups were compared: schizophrenic, brain damaged, and normal. Findings showed 55% of the schizophrenic patients performed in normal range on LNNB-I, 40% patients had borderline performance, and 25% patients were having definite impairment following Moses et al. (1983) decision rules. Schizophrenic patients showed more disturbances in C1, C3, C4, C10, and C11 scales, compared to brain damaged patients.

The LNNB has been the subject of extensive and intensive psychometry scrutiny and critical discussion since its public appearance. Significant criticism of the LNNB continues to be offered by some prominent neuropsychologists. Multiple published review articles have summarized trends that were involved in the early theoretical and psychometric development, clinical applications, and empirical evaluations of the LNNB (Franzen, 1985, 1986; Golden, 1981; Purisch & Sbordone, 1986). Although the majority of the tasks on the LNNB are not very complex, completion of the entire battery requires that the client be reasonably cooperative, motivated, and have at least a moderate span of attention. The task of administering and scoring the full battery is time consuming. Attempts have made to shorten the battery so that time may be saved. It focuses using the Pathognomonic scale as a screening tool, giving a shorter version of the LNNB through odd-even (Horton et al. 1988) or tree approaches, although these versions may still take an hour or more. Noting the relatively long periods of time often needed to administer the LNNB to seriously impaired or disturbed patients, Mikula (1981) developed a shortened form of the LNNB. Golden

(1989) suggested modification in administration for abbreviating administration of the LNNB in significantly impaired patients, as well as for less impaired patients. McCue et al. (1989) developed a short form of LNNB and assessed its application to discriminate between dementia and depression in the elderly.

Many users have expressed interest in screening methods so that testing of patients in whom there would be few findings could be skipped and patients for whom the test would reveal information could be more easily identified. Attempts to solve this problem have taken several forms. Traditionally, the most frequently used screening procedure involved obtaining a history and behavior description of a patient to determine if brain injury was likely; if it was, then the test would be given. Because of the demand for an effective LNNB screening procedure, studies were undertaken to develop screening tools that would predict whether administration of the LNNB was likely to yield useful information about a patient. The goal was to design instruments that would take less than 20 minutes to administer and score in all cases. The new screening instrument that was developed by Golden (1987) were not intended to classify patients as organic or non organic, but rather to predict whether giving the full battery is likely to yield significant results. It is intended to save time for the examiner by screening out patients for whom no deficits may be found on the LNNB.

In India, Jahan et al. (2005) reanalyzed the data of their previous study (Jahan et al., 2000) done on 120 epileptic patients and 30 normal subjects. They did stepwise discriminant analysis of each scale and found 22 items that discriminated both groups. Out of these 22 items, 7 items required reading and writing skills. Excluding those 7 items, 15 items may be used for patients who are illiterate. It has been found that for quick screening of probable cognitive deficit in epileptic patients this test may be used and patients scoring above the cut-off point may be selected for detail assessment (Jahan et al., 2005).

These screening tests (22- items and 15- items screening tests) were applied in epileptic population. Hence, in the present study an attempt was made to assess the cross validity of these two screening tests for identification of paranoid schizophrenic patients with probable cognitive deficit.

METHODOLOGY:

Sample: The present study consisted of 30 male, hospitalized paranoid schizophrenic patients. The study was carried out at Ranchi Institute of Neuro- Psychiatry and Allied Sciences (RINPAS), Ranchi, India. Patients were diagnosed as cases of paranoid schizophrenia according to Diagnostic Criteria of Research of International Classification of Diseases-10 (WHO, 1993). Literate, right-handed, cooperative patients were included. Patients who had comorbid psychiatric disorder, vision and hearing impairment, history suggesting organic pathology, substance abuse and mental retardation or significant physical illness were excluded.

The age range of subjects was between 25 and 45 years (mean age = 31.63 years; SD = 6.51). Their education was between 9- 15 years (mean years of education = 11.97 years; SD = 2.38). Majority of patients were married (73.33%), and were Hindu (83.33%). Sample had representation of patients residing in urban (30%), semi-urban (36.67%) and rural (33.33%) areas. Majority of patients were unemployed (40%). Mean age of onset of illness was 24.96 years and SD was 6.74 and average duration of illness was 6.5 years and SD was 4.31. All patients were having chronic illness. Findings of BPRS show that all patients were having either mild or very mild level of severity of psychopathology at the time of assessment. :

- **Socio Demographic and Clinical Data Sheet:** It is a semi structured proforma especially designed for this study to collect information about socio-demographic and clinical detail of the patient.
- **Hand Preference Battery (Annett, 1970).** Screening for handedness was done by Hand Preference Battery.

- **Brief Psychiatric Rating Scale (BPRS, Overall & Gorham, 1962).** BPRS was used to check the severity of psychopathology. BPRS is a well-established and appropriate scale for assessing patients with major psychiatric disorders, particularly schizophrenia. It is a 18- item scale measuring positive symptoms, general psychopathology and affective symptoms. Each item is rated on a 7- point scale (0 to 6) and accordingly severity of psychopathology assessed.
- **The Luria Nebraska Neuropsychological Battery (LNNB-Form I).** (Golden, et. al., 1985). The LNNB- I is a multidimensional battery designed to assess a broad range of neuropsychological functions. It consists of 269 items. Based on the basic functions involved these items are arranged under eleven clinical scales (Motor Function, Rhythm, Tactile, Visual Function, Receptive Speech, Expressive Speech, Writing, Reading, Arithmetic, Memory, and Intellectual Process). These items are categorized into five summary scales, eight localization scales and twenty eight factor scales.
- **22- Item screening test (Jahan, et al., 2005):** This is a 22- items screening test from LNNB- I. These 22-items are derived as a screening tool to identify epileptic patients with probable cognitive deficit. Overall classification rate of 22- items screening test for epileptic and normal subjects is 86.7% with sensitivity of 85% and specificity of 93.3% (Eigenvalue= .672; Wilk's Lamda= .598; df= 22; p <.001).mean and SD scores were 7.83 and 5.092 with cut- off score of 13.
- **15- Item screening test (Jahan, et al., 2005).** Out of those above mentioned 22 items, 7 items required reading and writing skill. Excluding those 7 items, 15 items may be used for patients who are illiterate. These 15 items also serve the same purpose. Overall classification rate of 15- items screening test for epileptic and normal subjects is 83.3% with sensitivity of 80.8% and specificity of 93.3% (Eigenvalue= .563; Wilk's Lamda= .640; df= 15; p <.001).mean and SD scores were 4.53 and 3.501 with cut- off score of 8.

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Procedure: After screening according to the inclusion and exclusion criteria, patients were selected for study. Clinical interview and required history was taken, and Socio-demographic and Clinical Data Sheet were filled. Information was cross-checked from the case record file whenever required. Handedness was decided using Annett's Hand Preference Battery. BPRS was applied to screen out patients with severe psychopathology. LNNB- I was administered in 2-3 sessions over a period of one day or two consecutive days. LNNB- I, 22- items screening test and 15- items screening test were interpreted. In the context of the obtained data, mean, SD, and percentage were applied for the analysis of the data.

RESULTS :

To find out number of patients, who scored above critical level on individual clinical and summary scales, number and percentage of patients above and below critical level was calculated (Table 1).

Table - 1 : Showing Number and percentage of patients above and below critical level on individual clinical and summary scales

Scales	Yes		No	
	No.	%	No	%
Motor Functions (C1)	8	26.67	22	73.33
Rhythm (C2)	22	73.33	8	26.67
Tactile Functions (C3)	10	33.33	20	66.67
Visual Functions (C4)	22	73.33	8	26.67
Receptive speech (C5)	16	53.33	14	46.67
Expressive speech (C6)	7	23.33	23	76.67
Writing (C7)	6	20.00	24	80.00
Reading (C8)	4	13.33	26	86.67
Arithmetic (C9)	15	50.00	15	50.00
Memory (C10)	13	43.33	17	56.67
Intellectual Processes (C11)	21	70.00	9	30.00
Pathognomonic (S1)	14	46.67	16	53.33
Left Hemisphere (S2)	7	23.33	23	76.67
Right Hemisphere (S3)	3	10.00	27	90.00
Profile Elevation (S4)	20	66.67	10	33.33
Impairment (S5)	20	66.67	10	33.33

Table 1 shows that on clinical scales patients scored above critical level on Rhythm and Visual Function (73%), followed by Intellectual Process (70%), Receptive Speech (53.33%), Arithmetic (50.00%), Memory (43.33%), Tactile Function (33.33%), Motor Function (26.67%), Expressive Speech (23.33%), Writing (20.005), and Reading (13.33%) scales. In summary scales, Profile Elevation and Impairment were the two scales where most of the patients (66.67% in both scales) scored above critical level.

Profile of all patients was classified as non-impaired, borderline, and impaired using scale elevation criteria. Two types of scale elevation criteria were used, one for general population and other for schizophrenic patients. To assess the deficit in specific neuropsychological functions, item interpretation was done. Item interpretation shows that schizophrenic patients had impairment in complex integrated function, followed by orientation and space, logical relation, contrast picture, blurred picture, application of grammatical structure, simple integrated operation, and sensory trace-tapping. On the basis of findings of item interpretation patients were categorized into no impairment, borderline and impaired range.

To assess the cross validity of 22-items and 15- items derived from LNNB-I, comparisons were done between these two screening scales and LNNB-I.

Findings show that most impaired functions found using 22 items screenings test and 15- items screening test were comprehension of thematic text, sensory trace- tap, comprehension of grammatical structure, logical relation and logical memory. To find out the level of impairment using 22-items and 15- items scales, a cut-off point 13 and 8 was used respectively and according to range for normal, borderline, and impaired performance, patients were categorized in three groups.

TABLE - 2 : Showing the No. and percentage of the patients having average, borderline and impaired performance on 22- items and 15- items Screening test

Item no.	Interpretation of items	Scoring					
		Normal		Borderline		Impaired	
		No	%	No	%	No	%
2 *	Simple movement of hand	12	40.0	15	50.0	3	10.0
13 *	Double plane	15	50.0	0	0.0	15	50.0
21 *	Smooth coordination of hand movement	16	53.3	7	23.3	7	23.3
62 *	Rhythmic tap: model	8	26.7	18	60.0	4	13.3
74 *	Geometrical figure	13	43.3	11	36.7	6	20.0
85 *	Stereognosis	9	30.0	17	56.7	4	13.3
87 *	Visual naming	17	56.7	8	26.7	5	16.7
95	Clock- time	13	43.3	11	36.7	6	20.0
122 *	Compound grammatical structure	9	30.0	0	0.0	21	70.0
125 *	Compound grammatical structure	15	50.0	0	0.0	15	50.0
128 *	Logical relation	11	36.7	0	0.0	19	63.3
169 *	Narrative speech: fluency	14	46.7	14	46.7	2	6.67
171	Appropriate grammatical structure	1	3.33	13	43.3	16	53.3
173	Appropriate grammatical structure	13	43.3	0	0.0	17	56.7
186	Grammar and spelling	11	36.7	15	50.0	4	13.3
199	Reading text	8	26.7	12	40.0	10	33.3
200	Reading text	2	6.67	14	46.7	14	46.7
218	Arithmetic operation: sign	13	43.3	9	30.0	8	26.7
228 *	Sensory trace: tap	9	30.0	0	0.0	21	70.0
235 *	Logical memory	6	20.0	5	16.7	19	63.3
240 *	Comprehension of thematic text	4	13.3	0	0.0	26	86.7
248 *	Simple concept of formation and definition	6	20.0	15	50.0	9	30.0

Note: * marked were included in 15- items screening test.

TABLE - 3 : Showing the range of impairment using different criteria

Criteria	Not impaired		Borderline		Impairment	
	No	%	No.	%	No.	%
General	7	23.33	3	10.00	20	66.67
Schizophrenia	10	33.33	2	6.67	18	60.00
Item interpretation	5	16.67	5	16.67	20	66.67
22-items screening	5	16.67	6	20.00	19	63.33
15-items screening	5	16.67	5	16.67	20	60.00

Table 3 shows that all criteria (scale elevation for general population, schizophrenic patients, item interpretation criteria, 22-items screening test, and 15- item screening test) yielded more or less similar result for impaired groups (20, 18, 20, 19, 20 respectively). According to scale elevation criteria (for general population and schizophrenic patients) more patients were categorized as having no impairment. Difference in identification was noticed for normal and borderline group. However, findings of item interpretation, 22- items screening test and 15- items screening test was more or less same.

DISCUSSION :

Findings of previous study by Nizamie (1991) showed 55% of the schizophrenic patients performed in normal range on LNNB-I, 40% patients had borderline performance, and 25% patients were having definite impairment following Moses et al. (1983) decision rules. Jain (1995) found that 20% schizophrenic patients performed in normal range, 33% patients performed in borderline range, and 47% patients performed in impaired range. In the present study, according to scale elevation criteria for general population, 23.33% were classified as normal category, 10.00% in borderline category and 66.67% in impaired category. While following the scale elevation criteria, applicable for schizophrenic patients, 33.33% patients were categorized as normal, 6.67% as borderline, and 60.00% as impaired. Findings suggest that both criteria classified nearly same patients as impaired.

The mean profile of paranoid schizophrenic suggests impairment in Intellectual Process (C11) followed by Rhythm Scale (C2), Arithmetic (C9) Visual Function (C4), and Receptive Speech (C5) (Table 5.4, Figure 1). Previous studies on schizophrenic patients done by Purisch et al. (1978) identified four scales - C2, C10, C5, and C11 where patient showed impairment. Finding of present study is similar for three scales (C2, C5, and C11) out of those four scales where impairment was noticed. In India, Sasi (1989) using five scales o

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schizophrenic found impairment in C5 and C9 scales. Schizophrenic patients showed more disturbances in C1, C3, C4, C10, and C11 scales (Nizamie, 1991). Jain (1995) also found more impairment in C2, C4, C11, C10 and C9 in mean profile of schizophrenia, which is quite similar to the mean profile of the present study.

In a previous study (Jahan, et al., 1999) it was found that the item interpretation might aid in the efficacy of the LNNB for identifying cognitive deficit in epileptic patients. Although each clinical scale includes functions that are related to one wide category, there is difference in the underlying neuropsychological mechanism. For example, in the Motor Function Scale, smooth coordinated movement, praxis and visuo-spatial organization are different from each other. If deficit is subtle, the scale is not elevated above the critical level. Since the item interpretation has the advantage of analyzing wide range of functions, it gives clearer picture of deficit. So, for detecting cognitive deficit, item interpretation criterion is a better choice (Jahan, et al. 2002).

In this study, 22- items screening test was derived on the basis of discriminant analysis, which proved to be effective in detecting the cognitive deficit on short time. Out of these 22 items, again 15 item were selected which can also be applied to illiterate patients. Summary table where different criteria for categorization were used show that following general criteria and criteria for schizophrenic patients 7 and 10 patients respectively showed no impairment. Whereas when item interpretation criteria as well as 22-items and 15- items screening tests were used, in all criteria same 5 patients showed no impairment. Those patients showing no impairment in following first two criteria, in item interpretation criteria they were under borderline category. But further analysis of data depicts that same 5 patients were identified as having no impairment when screening tools were applied, but 2 patients were missed and they were identified as borderline category. It suggests that in comparison to scale

elevation criteria the misidentification was false positive in nature, but not the false negative detection. Patients who were categorized in borderline category or impaired group they all need detail further assessment. Hence, no patient with cognitive deficit will be deprived of detail assessment.

Present findings suggest that 22- items and 15- items screening tests which were derived from previous studies (Jahan et al., 2000) as screening tools (Jahan et al., 2005) for epileptic patients, can also be applied to identify paranoid schizophrenic patients who may have neuropsychological deficits. Hence, 22-items screening test and 15-items screening test from LNNB-I may used to identify paranoid schizophrenic patients for detail neuropsychological assessment.

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