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Cognitive functioning among patients with schizophrenia in a Nigerian hospital: a comparison with mood disorder

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ABSTRACT

Objective: The study aimed to investigate correlates of cognition among patients with schizophrenia.
Methods: Over a three month period, in-patients diagnosed with schizophrenia (n = 50) and mood disorders (n = 50) were recruited into the study. Both groups of patients were assessed using the Schedules for Clinical Assessment in Neuropsychiatry (SCAN), the Annett Hand Preference Questionnaire (AHPQ) and the Global Assessment of Function Scale (GAF). Patients with schizophrenia were further assessed using the Positive and Negative Syndromes Scale, PANSS and the Clinical Global impression (CGI). The cognitive screen section of SCAN (comprising Verbal Trails Test and Mini Mental State examination, MMSE) and the cognitive factor of PANSS were used to assess cognitive function.
Results: No differences were found in the cognitive profile of patients with schizophrenia and mood disorder. Among patients with schizophrenia, poor verbal performance was associated with the negative or mixed syndrome ($p = 0.004$), left or mixed handedness ($p = 0.013$), greater illness severity ($p = 0.030$) and lower GAF scores ($p = 0.039$). Poor performance on MMSE correlated with higher total PANSS score ($p = 0.022$) and was also associated with the negative or mixed syndrome ($p = 0.003$) and lack of clinical improvement ($p = 0.035$).
Conclusion: Patients with the negative or mixed schizophrenia syndrome may suffer more cognitive deficit. Poor verbal performance among patients with schizophrenia may be associated with left or mixed handedness, more severe illness and poor functioning.

1. Background

Cognitive impairment is considered a core feature of schizophrenia that includes problems in speed of processing, attention/vigilance, working memory, verbal learning, visual learning, reasoning and problem solving, and social cognition (Green, 2006). Studies have established a relationship between cognition and functional outcome, consistent across community and psychosocial functioning, among patients with schizophrenia (Green, 2006; Heinrichs et al., 2009). These studies have led to an emerging perspective that while control of symptoms is crucial, it is not sufficient to ensure a good clinical outcome. Other investigators have reported a correlation between negative symptoms and functional capacity (Aubin et al., 2009). The relationship between cognitive impairment, symptom pattern and severity, and patient's level of functioning, is however subject to debate (Mohs, 1999). With respect to bipolar disorder, there is emerging evidence that cognitive impairment may also be a core feature of bipolar disorder, with cognitive deficits adversely affecting functional outcomes (Bora et al., 2009; Green, 2006). This raises the question of whether cognitive dysfunction is a feature of psychosis rather than of schizophrenia as a discrete category.

A search of the literature revealed a paucity of studies on cognitive functioning among Nigerian patients with schizophrenia. This study therefore aimed to compare cognitive function among patients with schizophrenia with mood disorder patients, as well as to investigate factors associated with poor cognitive function among patients with schizophrenia.

2. Methods

The study was conducted among patients on admission at the Federal Neuropsychiatric Hospital, Yaba, Lagos, Nigeria. Consecutively admitted patients with a diagnosis of schizophrenia [n = 50] or mood disorder [n = 50] were recruited for the study. Criteria for inclusion were being above 18 years of age and meeting diagnostic criteria for *either* schizophrenia or mood disorder. Criteria for exclusion were having a history of substance use or significant neurological disease (seizure disorder, head injury, space occupying lesions, dementia), or meeting diagnostic criteria for *both* schizophrenia and mood disorder (i.e. schizoaffective disorder).

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2.1. Instruments

2.1.1. Sociodemographic questionnaire

A questionnaire was administered to each consenting patient and control subject concerning basic demographic information including age, sex, marital status, religious affiliation, ethnicity, occupational status and highest educational level. Duration of illness and age of onset of illness were obtained by the history obtained from the patient and relative. Hospital records were also consulted.

2.1.2. Schedules for Clinical Assessment in Neuropsychiatry, SCAN

Ascertainment of patient diagnosis and cognitive screening was done using the Schedules for Clinical Assessment in Neuropsychiatry, SCAN (Wing et al., 1990), for which the lead author has received formal training. Reliability of all SCAN scales has been found to be moderate to substantial (Schutzwohl et al., 2007). Diagnosis was based on ICD-10 criteria, for which the SCAN is suited. The SCAN has three components: the 10th edition of the Present State Examination (PSE 10), the Item Group Checklist (IGC), and the Clinical History Schedule (CHS). PSE 10 itself is in two parts; Part I includes section 6 (Depressed Mood and Ideation) and section 10 (Expansive Mood and Ideation) which are relevant for mood disorder diagnosis. Part II covers psychotic and cognitive disorders and observed abnormalities of speech, affect and behaviour, and is used to interview patients to make a diagnosis of schizophrenia.

Section 21A (Screening for Cognitive Impairment or Decline) of the SCAN comprises the Verbal Trails Test and the Mini-Mental State Examination. The verbal trails test is a screening test for front-subcortical dysfunction that may not be picked up by the MMSE (Abe et al., 2004). The Mini-Mental State Examination (Folstein et al., 1975) is a brief tool for assessment of cognitive function. It consists of items covering orientation, registration, attention and calculation, recall, and language. There is a total possible score of 30.

2.1.3. Positive and Negative Syndrome Scale, PANSS

The Positive and Negative Syndrome Scale, PANSS (Kay et al., 1987) is a 30-item rating instrument used for dimensional and typological assessment of schizophrenia patients. The 30 items are subdivided into positive (7 items), negative (7 items) and general psychopathology (16 items). On the basis of these, patients are classified as having a positive, negative or mixed syndrome.

A five-factor structure of the PANSS, with the items conceptual disorganization (P2), difficulty in abstract thinking (N5) and poor attention (G11) making up a cognitive factor has been described (Rodriguez-Jimenez et al., 2013). A cognitive factor score on these three items was obtained for all patients by summing scores on all three items.

2.1.4. Annett Hand Preference Questionnaire, AHPQ

The Annett Hand Preference Questionnaire (Annett, 1970) is a 12-item scale for assessment of hand preference. Participants are required to indicate whether they use their right, left or either hand for six primary and six non-primary common actions. The primary actions are: writing, throwing, wielding a racket, striking a match, hammering, and brushing teeth. The nonprimary actions are: using scissors, threading a needle, sweeping with a broom, using a shovel, dealing cards, and opening a jar.

2.1.5. Clinical Global impression, CGI

The CGI scale (Guy, 1976; Haro et al., 2003) evaluates the overall severity of mental disorders. It consists of three different global measures designed to rate the effectiveness of a particular treatment: (i) severity of the illness (assessment of the current severity of symptoms); (ii) global improvement (comparison of the patient's baseline condition to his or her current condition); and (iii) efficacy index (evaluation of the patient's improvement from baseline in relation to treatment side-effects).

2.1.6. Global Assessment of Function Scale, GAF

The GAF Scale (American Psychiatric Association, 1994) is an observer-rated single rating of functioning on a 100 point scale.

2.2. Ethical considerations

Ethical approval was obtained from the Ethical Committee of the Federal Neuropsychiatric Hospital, Yaba, Lagos, Nigeria. Written informed consent was obtained from all subjects after the study protocol had been explained to them.

2.3. Study procedure

Study subjects from each designated ward were recruited as listed in the nominal roll, which is a record of patients by date of admission and provisional diagnosis. Those with provisional diagnosis of schizophrenia or mood disorder were approached and after providing informed consent, were interviewed with the Schedules for Clinical Assessment in Neuropsychiatry (SCAN). Those who met diagnostic criteria for either group (schizophrenia or mood disorder) were then interviewed with the socio-demographic questionnaire, the Annett Hand Preference Questionnaire (AHPQ) and the Global Assessment of Function Scale (GAF). Patients with schizophrenia were further assessed using the Positive and Negative Syndrome Scale, PANSS and the Clinical Global impression (CGI). The cognitive screen section of SCAN (comprising Verbal Trails Test and Mini Mental State examination, MMSE) was also administered to both groups of patients.

2.4. Data analytic procedures

Results were calculated as frequencies. Group comparisons were done using chi-squares (categorical variables), t tests, analysis of variance and bivariate correlation where appropriate (continuous variables). All tests were 2-tailed, and the level of significance was set at $P < 0.05$. 95 % Confidence Intervals (95% CI) were calculated where appropriate. In using chi squares, Fisher's exact test was used in cases where there were fewer than 5 subjects in a cell.

Statistical analysis was done using the Statistical Package for Social Sciences, version 15 (SPSS 15).

3. Results

A total of 100 patients (50 with schizophrenia, 50 with mood disorder) were approached, all of whom agreed to take part in the study. Patients with mood disorder included 34 with bipolar affective disorder and 16 with major depressive disorder.

The mean age of patients with schizophrenia and mood disorder was 40.3 years (SD 11.8) and 37.2 years (SD11.9) respectively ($t = 1.298$, $df = 98$, $p = 0.197$). Mean duration of illness for both groups was 10.2 years (SD 8.2) and 7.1 years (SD 8.7) respectively, with no significant difference ($t = 1.773$, $df = 98$, $p = 0.079$). Mean age of onset for both groups was 30.2 years (SD 11.8) and 30.1(SD 10.4) respectively ($t = 0.027$, $df = 98$, $p = 0.979$).

Other socio-demographic variables are presented in Table 1. Significant differences were found with respect to gender and occupational status. Table 2 shows a comparison of the performance of patients with schizophrenia and mood disorder on the domains of cognition. No significant differences were found. Among patients with schizophrenia, a comparison of performance on the verbal trails test with selected clinical variables is shown in Table 3. Poor performance on the verbal trails test was associated with the negative/mixed schizophrenia syndrome, left or mixed handedness, marked/severe illness, and lower GAF scores.

Lower total scores of schizophrenia patients on the MMSE were found to correlate with higher PANSS total score ($p = 0.022$) and the negative or mixed syndrome ($p = 0.013$). Patients with paranoid

Table 1
Socio-demographic profile of study subjects.

	Schizophrenia (n = 50)	Mood Disorder (n = 50)	Differences
Gender			
Male	27 (54%)	14 (28%)	$\chi^2 = 6.986$, df = 1,
Female	23 (46%)	36 (72%)	p = 0.014*
Marital Status			
Married	14 (28%)	17 (34%)	$\chi^2 = 0.421$, df = 1,
Not Married	36 (72%)	33 (66%)	p = 0.666
Religion			
Christian	42 (84%)	41 (82%)	$\chi^2 = 0.071$, df = 1,
Non-Christian	8 (16%)	9 (18%)	p = 0.790
Highest Education			
Secondary or less	36 (72%)	30 (60%)	$\chi^2 = 1.604$, df = 1,
Tertiary	14 (28%)	20 (40%)	p = 0.291
Employment Status			
Employed	10 (20%)	22 (44%)	$\chi^2 = 6.618$, df = 1,
Unemployed	40 (80%)	28 (56%)	p = 0.018*

* $p < 0.05$.

schizophrenia scored significantly higher on the MMSE than the other subtypes (p = 0.041). Higher total MMSE scores also correlated with clinical improvement (p = 0.035).

To test for differences in performance on the MMSE by educational level, level of education was divided into secondary or less, and tertiary. A comparison of mean scores showed no significant difference in total MMSE score by educational level (t = −1.622, df = 48, p = 0.111). No significant differences were also found in the following sections: orientation (t = −0.818, df = 48, p = 0.417), registration (t = 0.796, df = 48, p = 0.430), recall (t = 0.830, df = 48, p = 0.410) and language (t = −1.867, df = 48, p = 0.068). There was however a significant difference with attention (t = −3.870, df = 48, p < 0.001). Further analysis was done with level of education divided into primary or less, secondary, and tertiary. This similarly revealed a significant difference only in performance on attention; post hoc Bonferonni analysis showed the difference to be between primary or less and tertiary (p = 0.001) and between secondary and tertiary (p = 0.003) but not between primary or less and secondary (P = 0.193).

The three items comprising the cognitive factor of PANSS were found to have good internal consistency (Cronbach's alpha 0.765). Scores on each item were added to give a total cognitive factor score. The total scores correlated with total scores on the MMSE (r = −0.720, p < 0.001) and the GAF (r = −0.379, p = 0.007).

With respect to socio-demographic variables, there was a negative correlation between the age of the patient and scores on the cognitive factor (r = −0.338, p = 0.016). No correlation was however found with duration of illness or age at onset. Table 4 contains associations between other socio-demographic and clinical variables of the schizophrenia patients with the PANSS cognitive factor scores. Significant associations were found with occupational status, type of schizophrenia presentation, illness severity and treatment response (both assessed by the CGI) and GAF scores.

Table 2
Group comparison of cognitive function.

	Schizophrenia (n = 50)	Mood Disorder (n = 50)	Differences
Verbal Trails (%)			
Good	19 (38%)	23 (46%)	$\chi^2 = 0.657$
Poor	31 (62%)	27 (54%)	df = 1, p = 0.418
MMSE (Orientation)			
Mean (SD)	8.7 (1.7)	9.0 (1.2)	t = −1.076, df = 98, p = 0.285
MMSE (Registration)			
Mean (SD)	2.9 (0.5)	2.9 (0.5)	t = −0.2, df = 98, p = 0.84
MMSE (Attention/Calculation)			
Mean (SD)	2.3 (1.9)	2.7 (1.7)	t = −1.17, df = 98 p = 0.245
MMSE (Recall)			
Mean (SD)	1.6 (1.2)	2.0 (1.1)	t = −1.85, df = 98 p = 0.067
MMSE (Language)			
Mean (SD)	7.2 (2.1)	7.3 (2.1)	t = −0.24, df = 1,98 p = 0.810
MMSE (Total)			
Mean (SD)	22.4 (2.1)	23.8 (2.1)	t = −1.48, df = 98 p = 0.143

4. Discussion

This study aimed to investigate factors associated with cognitive dysfunction among patients with schizophrenia, on which there is paucity of data in Sub-Saharan Africa. The study revealed no difference in the cognitive profile of patients with schizophrenia and mood disorder. This agrees with a meta-analysis of studies comparing patients with schizophrenia and mood disorder, which equally found no notable difference in their cognitive profile (Bora et al., 2009).

However, among patients with schizophrenia, the study revealed poorer cognitive performance among patients with the negative or mixed syndrome. This had been earlier reported in Caucasian populations (Mohs, 1999; Stirling et al., 2003) as well as in Nigeria (Gureje, 1989).

Patients with greater cognitive deficits were also found to have greater illness severity and poorer functioning. A correlation between symptom severity and functional outcome has been previously reported (Heinrichs et al., 2009). While Mohs (1999) reported a positive correlation between cognitive deficit and functional impairment but not positive and negative symptoms, Lin et al. (2013) found clinical (mainly negative) symptoms to be a mediator of the influence of neurocognition and social cognition on functional outcome of schizophrenia. According to Hofer et al. (2005), cognitive dysfunction is the strongest clinical predictor of poor long term outcome in schizophrenia. They reported associations between severity of cognitive deficits and social dysfunction, impairments in independent living, occupational limitations, and disturbances in quality of life. Holthausen et al. (2007) equally found significant differences between patients with and without cognitive deficits in competitive employment status and vocational functioning.

The finding of poor verbal performance among patients with a negative or mixed syndrome would suggest that the neuroanatomical substrate for both is similar, and these features may be useful in predicting illness severity and functional outcome. While an association was found between performance on the verbal trails test and hand preference, no such association was found with the cognitive factor of PANSS. This raises the possibility that there is an association between hand preference and verbal performance specifically, rather than with cognitive function as a whole. Annett (1998) has proposed a 'right shift factor' which may account for a convergence of laterality phenotypes as evidence of decreased cerebral lateralization in schizophrenia.

Prior studies point at a modest correlation between the PANSS cognitive factor and comprehensive neuropsychological assessments, for instance as reported by Good et al. (2004) among antipsychotic naïve, first episode psychosis patients. However, Bowie et al. (2002) reported a modest but significant relationship between the negative total symptom score of PANSS and the MMSE, as well as between the MMSE and the Alzheimer's Disease Assessment Scale—Late Version Cognitive factor, ADAS-L-Cog, among geriatric schizophrenia patients with severe impairment. Although no correlation was found in this study between duration of illness and MMSE scores or performance on the PANSS cognitive factor, the possible mediating effect of this and other variables on cognitive performance bears further investigation.

Table 3
Clinical variables and performance of schizophrenia patients on verbal trails test.

	Good performers (n = 19)	Poor performers (n = 31)	Difference
Presentation			
Paranoid	16 (45.7%)	19 (54.3%)	$\chi^2 = 2.947$, df = 1, p = 0.117
Others	3 (20%)	12 (80%)	
Syndrome type			
Positive	15 (57.7%)	11 (42.3%)	$\chi^2 = 8.916$, df = 1, p = 0.004*
Negative/mixed	4 (16.7%)	20 (83.3%)	
Hand preference			
Right	17 (50%)	17 (50%)	$\chi^2 = 6.494$, df = 1, p = 0.013*
Left/mixed	2 (12.5%)	14 (87.5%)	
Illness Severity			
Mild/moderate	7 (70%)	3 (30%)	$\chi^2 = 5.433$, df = 1, p = 0.030*
Marked/severe	12 (30%)	28 (70%)	
Therapeutic Response			
Clinical improvement	15 (46.9%)	17 (53.1%)	$\chi^2 = 2.972$, df = 1, p = 0.130
No improvement	4 (22.2%)	14 (77.8%)	
GAF Score			
Mean(SD)	47.1 (SD 10.3)	41.1 (SD 8.0)	t = 2.290, df = 48 P = 0.026*

* $p < 0.05$.

The study was limited by a cross sectional design which prevents inference of causality. The test battery was also limited to clinical assessments; subsequent studies will need to involve a more comprehensive neuropsychological battery, as several studies have shown that the domains of cognition which are affected in schizophrenia or psychosis go beyond what is assessed by this study. The long mean duration of illness of subjects in the current study is also a possible confounder. Future studies may need to compare first episode or neuroleptic naïve patients.

5. Conclusion

Patients with the negative or mixed schizophrenia syndrome may suffer more cognitive deficit. Poor verbal performance among patients with schizophrenia may be associated with left or mixed handedness, more severe illness and poor functioning. A convergence of these findings may be of aetiological importance and may help in selecting patients for cognitive intervention.

Table 4
Association between PANSS cognitive factor and schizophrenia patient variables.

Variables	n	Mean (SD)	t	p
Sex				
Male	27	8.4 (3.4)	0.768	0.446
Female	23	7.7 (3.1)		
Education				
Secondary or less	36	8.4 (3.5)	1.079	0.286
Tertiary	14	7.3 (2.5)		
Employment Status				
Employed	10	6.1 (1.6)	−2.240	0.030*
Unemployed	40	8.6 (3.4)		
Presentation type				
Paranoid	35	7.0 (2.6)	−4.288	<0.001*
Other	15	10.7 (3.1)		
Hand Preference				
Right	34	7.6 (3.3)	−1.484	0.144
Left/mixed	16	9.1 (3.0)		
Verbal Trails				
Good	19	6.0 (2.5)	−4.065	<0.001*
Poor	31	9.4 (3.0)		
Illness Severity				
Mild/Moderate	10	6.2 (2.8)	−2.116	0.040*
Marked/Severe	40	8.5 (3.2)		
Treatment Response				
Clinical Improvement	32	7.3 (2.9)	−2.430	0.019*
No Improvement	18	9.5 (3.4)		

* $p < 0.05$.

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Contributors

Okewole A.O. was involved in study conception and design as well as data collection and analysis. Adewuya A.O. was involved in study conception and design as well as data interpretation. Makanjuola R.O.A. was also involved in study design and data interpretation. All authors contributed to manuscript writing and revision for intellectual content.

Conflict of Interest

The authors declare that they have no conflicts of interest.

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