Does premorbid IQ have a pathoplastic effect on symptom presentation in schizophrenic and bipolar disorders?

Un QI prémorbide a-t-il un effet pathoplastique sur la présentation des symptômes dans les troubles schizoides et bipolaires?

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PANSS;
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Summary

Introduction. — The poor premorbid IQ has been considered as a predisposing factor for the development of schizophrenia and other psychoses as well as predictive of poor long-term outcome. We hypothesise that premorbid IQ could influence symptom expression during an index episode (i.e. a short-term outcome).

Aim of the study. — We studied 48 patients with schizophrenic disorder and 56 with bipolar disorder during an ‘index episode’ using the test di intelligenza breve (TIB) for the premorbid IQ evaluation, and the positive and negative syndrome scale (PANSS).

Results. — Using the premorbid IQ as a criterion variable (i.e. low versus high IQ groups) the one-way ANOVA analysis showed that low IQ schizophrenic patients had more PANSS positive symptoms and “thought disturbances” than both high and low IQ bipolars. The low IQ schizophrenic patients showed more cognitive symptoms than bipolar patients with high IQ. Furthermore, no PANSS differences were seen between high IQ schizophrenics and low IQ bipolars. In the total and bipolar groups the correlation coefficients between TIB scores and PANSS scales reached statistical significance for the cognitive cluster only. No correlations were seen in the schizophrenic group.
Introduction

Several studies examined premorbid IQ in schizophrenia \cite{3,9,12,25,15,6,29} reporting an excess of patients with low score and poor functional outcome. Association between premorbid IQ and cognitive deterioration has also been observed \cite{32,23}.

Less clear is whether lower premorbid IQ is specific to schizophrenia \cite{14,16}. David et al. \cite{11} examining premorbid IQ in a cohort of 50,000 male conscripts, found a linear relationship between low IQ and risk of schizophrenia, but the risk for non-schizophrenic psychoses was also increased in those with lower IQ, with a less marked and non linear effect. Cannon et al. \cite{7} reported that impaired premorbid social functioning is not specific to schizophrenia, but in bipolar disorder is also seen, although schizophrenics’ premorbid IQ is lower. Sigurdsson et al. \cite{28} found over-represented low IQ, in early-onset bipolar disorder. Cannon et al. \cite{5} found childhood psychological precursors for schizophrenia and affective disorders differ, not simply representing risk for psychosis. Low IQ has also been observed to likely expedite the onset of bipolar disorder \cite{27}.

Zammit et al. \cite{36} indicated that premorbid IQ is likely to be a risk factor for psychotic illness in general rather than schizophrenia, in particular. However, premorbid IQ score did not seem to have an effect on risk of developing bipolar disorder. More recently, two other studies reported that most of diagnostic categories are associated with low IQ scores \cite{21,35}.

If the association of premorbid IQ with long-term outcome has been widely explored, less attention has been paid to the relationship with more proxy measure of outcome. The aim of this study is to explore the role of premorbid IQ on the symptom expression during an index episode of schizophrenic and bipolar disorders. We predicted that low versus high premorbid IQ patients would show different symptom profile.

For this purpose, we investigated premorbid IQ in both bipolar and schizophrenic patients, hospitalized for an index episode using the test di intelligenza breve (TIB) \cite{26,23}, Italian adaptation of the national adult reading test (NART) \cite{22}. The symptoms were assessed using the positive and negative syndrome scale (PANSS), with particular attention to PANSS “cognitive symptoms”, reported to be a valid measure of cognitive dysfunction in schizophrenia and mania \cite{4,10}.

Methods

Subjects

The subjects were 104 patients consecutively admitted to Villa Serena medical center for the treatment of an acute psychotic episode between 2000 and 2002. Forty-eight patients meet the DSM-III-R criteria for schizophrenia, and 56 the criteria for a manic or mixed bipolar episode \cite{2}. Subjects were diagnosed by a senior psychiatrist (A.R.), who personally interviewed the patients according to the structured clinical interview for DSM-III-R \cite{30}.

The schizophrenic sample included 41 men and 7 women. The mean age of the patients was 42.13 years (S.D. 10.28), and educational level was 8.79 years (S.D. 3.44). The age at onset of symptoms was 21.09 years (S.D. 5.6) with a mean duration of illness of 17.15 years (S.D. 15.14). At that time all schizophrenic patients were taking classical antipsychotics, and the mean chlorpromazine-equivalent dose
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The bipolar patients were 29 men and 27 women. The mean age of the patients was 44.84 years (S.D. 11.07) and educational level was 9.23 years (S.D. 4.18). The age at onset of symptoms was 24.66 years (S.D. 8.2). They were all taking classical neuroleptics, lithium (n.15), carbamazepine (n.13) and valproic acid (n.28). The mean chlorpromazine-equivalent dose [19] was 645.13 mg (S.D. 102.10) at the time of the clinical evaluation.

All the subjects were screened for history of head injury, substances and alcohol abuse or serious neurological or physical disease and provided informed consent after complete description of the study, in accordance with the university institutional review board.

Assessments

Symptom severity was assessed by using the 30 items positive and negative syndrome scale [18] at the admission. The PANSS scales and cluster scores were obtained as described by Kay [18]. The PANSS cognitive component was calculated summing the following items: difficulty in abstract thinking, stereotyped thinking, cognitive disorganization, lack of judgement and insight, poor attention, tension, mannerism and posturing, according to Bell et al. [4].

Patients were tested using the test di intelligenza breve [26], just before discharge, in a remission phase and however no later than 20 days after PANSS evaluation (hospital stay range 13—20 days). The TIB consists of 54 words (34 effective test-words with irregular accent and 20 control-words with high frequency of use), that subjects have to read and pronounce. The total number of mistakes of reading defines the TIB error score. The estimated IQ scores (i.e. performance, verbal and total) are calculated through the regression of equations taking into account sex, age and educational level.

The median of the estimated total IQ score of each clinical sample was 98.83 for schizophrenics and 102.47 for bipolars. These values have been used to split the two samples in high- and low-IQ subgroups.

Statistical analysis

Student t-test and one-way analysis of variance (ANOVA) with Scheffé method as post hoc analysis have been used for between-group comparisons with TIB-IQ (low versus high) as a criterion variable. Pearson’s product moment has been used for correlation analysis among TIB scores and PANSS cluster scores (six clusters). Chi-square has also been used.

All analyses yielding a p-value of 0.05 or less were considered significant; for correlation analysis Bonferroni correction of alpha level (p < 0.05/6 = 0.008) was used.

Results

The means and standard deviations of the demographic and clinical variables are presented in Table 1. Schizophrenics showed significantly higher PANSS total and positive scales, higher scores on thought disturbances and cognitive clusters. Bipolars showed higher depression cluster score.

Table 1 Demographic, estimated IQ scores and PANSS scores of schizophrenic and bipolar patients [mean (S.D.)].

<table>
<thead>
<tr>
<th></th>
<th>Schizophrenic patients (n = 48)</th>
<th>Bipolar patients (n = 56)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (m/f)</td>
<td>41/7</td>
<td>29/27</td>
</tr>
<tr>
<td>Current age (years)</td>
<td>42.13 (10.28)</td>
<td>44.84 (13.04)</td>
</tr>
<tr>
<td>Length of admission (days)</td>
<td>35.27 (18.39)</td>
<td>32.18 (18.41)</td>
</tr>
<tr>
<td>TIB estimated IQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total IQ</td>
<td>100.0 (9.4)</td>
<td>101.4 (11.1)</td>
</tr>
<tr>
<td>Verbal IQ</td>
<td>98.7 (10.1)</td>
<td>99.0 (12.2)</td>
</tr>
<tr>
<td>Performance IQ</td>
<td>99.2 (9.3)</td>
<td>101.1 (10.9)</td>
</tr>
<tr>
<td>PANSS scales</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>75.58 (18.51)</td>
<td>68.57 (16.39)</td>
</tr>
<tr>
<td>Positive</td>
<td>19.13 (6.68)</td>
<td>14.07 (5.10)</td>
</tr>
<tr>
<td>Negative</td>
<td>18.50 (5.15)</td>
<td>17.05 (5.99)</td>
</tr>
<tr>
<td>General psychopathic</td>
<td>37.96 (9.41)</td>
<td>37.45 (9.37)</td>
</tr>
<tr>
<td>PANSS cluster scores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anergia</td>
<td>9.56 (3.50)</td>
<td>8.91 (3.65)</td>
</tr>
<tr>
<td>Thought disturbance</td>
<td>10.42 (5.08)</td>
<td>7.27 (2.69)</td>
</tr>
<tr>
<td>Activation</td>
<td>6.42 (2.55)</td>
<td>5.80 (1.78)</td>
</tr>
<tr>
<td>Paranoid</td>
<td>6.29 (2.40)</td>
<td>5.61 (2.50)</td>
</tr>
<tr>
<td>Depression</td>
<td>10.41 (4.28)</td>
<td>12.54 (3.77)</td>
</tr>
<tr>
<td>Cognitive</td>
<td>18.10 (5.16)</td>
<td>15.25 (4.78)</td>
</tr>
</tbody>
</table>

Student t-test: \( p < 0.05, ^{\text{§}} p < 0.01, ^{\text{§§}} p < 0.005, ^{\text{***}} p < 0.0005. \)

\( ^a \) Chi-square: \( p < 0.001. \)

In the total sample (n = 104) correlation coefficients between TIB scores and PANSS scales reached statistical significance for the cognitive cluster only (cognitive cluster score versus estimated performance IQ \( r = -0.38 \) \( p < 0.0005; \) versus estimated verbal IQ \( r = -0.26, p < 0.006; \) versus estimated total IQ \( r = -0.31, p < 0.001). In the bipolar sample, correlation coefficients between TIB scores and PANSS cognitive cluster score were higher than in the total sample (cognitive cluster score versus estimated performance IQ \( r = -0.45, p < 0.0005; \) versus estimated verbal IQ \( r = -0.39, p < 0.003; \) versus estimated total IQ \( r = -0.42, p < 0.001), while no statistically significant correlation was seen in the schizophrenic sample.

No correlation were seen between demographic and clinical variables and between chlorpromazine-equivalent dose and clinical and cognitive scores.

Results for TIB identified subgroups

Statistically significant differences did emerge for PANSS positive symptoms, thought disturbances and cognitive score (Table 2). For all these three variables, high IQ bipolar patients did show less severe symptoms than low IQ schizophrenics at the post hoc analysis (Scheffé test with significance level 0.05), but no differences were seen between low bipolars and high IQ schizophrenics. Eventually low bipolar patients do have lower positive symptoms and thought disturbances than low IQ schizophrenics.
Discussion

The use of premorbid IQ as a criterion variable add clinically relevant knowledge to patients who, in spite of having similar symptom severity, fall into different diagnostic categories [33,34].

Our data could be concordant with the clinical impression that some bipolar patients during an acute episode can be misdiagnosed as schizophrenics (i.e. low IQ bipolars versus high IQ schizophrenics in our sample) and with the observation that diagnostic flux between bipolar disorder and other disorders, especially schizophrenia, is relatively frequent [8]. As a matter of fact, the premorbid IQ could in part explain this finding. The categorisation we performed allows to discriminate bipolars with high IQ from low IQ schizophrenics as they lay at the extreme of a continuum of premorbid IQ.

On the other hand, low IQ bipolars are similar in PANSS scores to high IQ schizophrenics. This result could be consistent with literature of a lack of discrimination in cognitive status between bipolars and schizophrenics with less negative symptoms [17] and with the evidence of a weak true diagnostic value of the distinction between less negative symptoms [17] and with the evidence of consistent with literature of a lack of discrimination in IQ. This finding can be further interpreted in the light of the hypothesis of a *premorbid intelligence continuum* with low IQ schizophrenics at one end and high IQ bipolars at the other one. The premorbid IQ, among other factors, could affect the *intermediate outcome* and obscure diagnostic boundary (i.e. between high IQ schizophrenics and low IQ bipolars).

If this is so, particular attention should be paid in the diagnostic workup of patients on the extremes of this cognitive dimension. For example, a psychosis with a low IQ could be erroneously diagnosed as schizophrenia, as psychosis with high IQ could be erroneously diagnosed as bipolar.

Since the correlation coefficients shows significant negative relationship between PANSS cognitive component and estimated IQ scores in the bipolar sample only (i.e. the higher TIB score, the lower PANSS), it could be argued that different is the meaning of cognitive disturbances in the two clinical groups [24].

On the basis of our results, we hypothesise that investigation of premorbid cognition may improve the diagnostic attention of the adult mental health services in the delivery of care of vulnerable individuals as suggested by Hassiotis et al. [16]. *Premorbid intelligence dimension* can be used as a possible criterion to disentangle complex clinical presentations in functional psychoses.

References


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