Correlation of Severity of Psychiatric Patients' Delusions With Right Hemispatial Inattention (Left-Turning Behavior)

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Studies associate psychotic disorders with various forms of subtle inattention to the right hemispace (left-turning behavior). The authors examined the correlation between this dopamine-related sign *and severity of delusions (presumably dopaminergic* symptoms*) in 20 psychotic patients. Delusions were significantly correlated with severity of left-turning bias, and this neurological sign accounted for 33% of the variance in severity of delusions.*
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Over the last 5 years, several studies of unmedicated schizophrenic patients have identified various forms of subtle inattention to the right hemispace (i.e., a spontaneous, subtle preference for turning toward the left hemispace while moving about) (1–3). Hemispatial attention and inattention (turning asymmetry) are partly controlled by ascending subcortical dopaminergic systems (4, 5). Since delusions are among the few symptoms of schizophrenia that are responsive to dopamine blockers, we hypothesized that left-turning asymmetry would correlate with severity of delusional symptoms.

METHOD

The subjects of this study were 20 research inpatients (18 male and two female), ranging in age from 15 to 70 years, who were assessed by a neuropsychiatric special evaluation unit of a VA medical center. Each had received a diagnosis of schizophrenia on the basis of the Structured Clinical Interview for DSM-III-R—Patient Version (SCID-P) (6), with the exception of one patient who was diagnosed as having alcohol hallucinosis and significant delusions. All patients except one had been free of neuroleptic medications for at least 1 month before entering the study. The exception was a patient hospitalized for the first time who had never previously taken antipsychotic medication and who was in her third day of taking a neuroleptic when she started the study. Each patient had a complete psychiatric and neurological examination, laboratory tests, urinalysis, and urine toxicology screening. The patients were administered the Scale for the Assessment of Positive Symptoms (7), the Scale for the Assessment of Negative Symptoms (8), and the Brief Psychiatric Rating Scale (BPRS) (9) on the first day of the study. Both right-handed subjects (N=17) and left-handed subjects (N=3) were included because several studies have shown that subjects' handedness has surprisingly little effect on turning behavior (1, 10, 11).

The mean age of the subjects was 37 years (SD=11), the mean number of months since they had last taken neuroleptics was 26 (SD=37), and the mean number of years they had been ill was 13 (SD=9). The subjects' mean scores on the BPRS and the scales for negative and positive symptoms were, respectively, 41 (SD=12), 35 (SD=18), and 44 (SD=18).

After giving informed consent, the subjects were asked to wear a monitoring device on their belts during waking hours. The device has been described previously (1, 10, 11). The activity monitors were worn for a mean of 93 hours (SD=46), and the mean total number of turns recorded was 872 (SD=619). A minimum of 200 full turns was required for a subject to be included in the study. The requirement was met by patients wearing the monitor for 2–8 days. The subjects were asked to go about their usual activities and were unaware of the nature of the device.

We chose a priori to use the Scale for the Assessment of Positive Symptoms for measuring delusional symptoms because of the great detail obtainable with the use of this scale, which includes 12 questions on such symptoms. We computed a mean score for the 12 questions, henceforth denoted as the mean delusion score. The mean delusion score for the group on the Scale for the Assessment of Positive Symptoms was 1.4 (SD=0.8).

The index of turning (circling) behavior was percent

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right turns (1), defined as the number of 360° turns toward the right hemispace, divided by the total number of full 360° turns in either direction, multiplied by 100. Therefore, percent right turns reflects hemispatial-preference asymmetry and is independent of total activity. Values between 0% and 40% reflect varying degrees of right hemispatial inattention (right hemispatial neglect), and values between 60% and 100% reflect varying degrees of left hemispatial inattention (left hemispatial neglect) (1, 10, 11).

We hypothesized that in unmedicated psychotic patients there would be an inverse relation between right-turning preference (percent right turns) and the severity of delusions as recorded by the mean delusion score on the Scale for the Assessment of Positive Symptoms. We hypothesized that the severity of left-turning behavior is indicative of the severity of delusional symptoms and that subjects with lower percent right turns (i.e., marked preferential turning to the left) would manifest higher delusion scores. To test this hypothesis, we calculated a regression equation, using percent right turns as a predictor of the mean delusion score. Two additional regression analyses were obtained with the use of the more general indexes of psychosis (total score on the Scale for the Assessment of Positive Symptoms) and of psychopathology (total BPRS score).

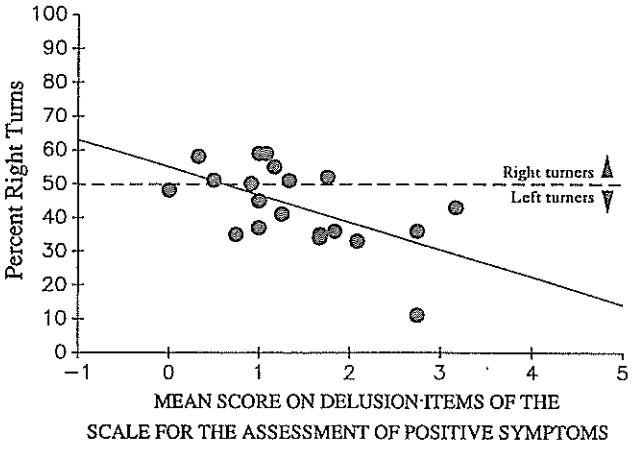
One subject exhibited extreme left-turning behavior (percent right turns=11, almost 3 standard deviations from the mean). Because of the small size of the study group, we recalculated the analysis after removing the data on this subject. Because the hypothesis was directional (i.e., that there would be an inverse relation between percent right turns and mean delusion score), all analyses were calculated with a one-tailed probability value.

RESULTS

The linear regression, with the mean delusion score the dependent variable and percent right turns as the predictor, was significant ($F=8.67$, $df=1, 18$, $p=0.004$; $r=-0.57$). The results remained significant even after the removal of the one subject exhibiting extreme left-turning asymmetry ($F=4.46$, $df=1, 17$, $p<0.03$). Figure 1 presents a scatterplot of the data and the regression line of best fit. Turning behavior accounted for 33% of the variance in mean delusion scores (29% when the adjusted value was used).

Scores on the Scale for the Assessment of Positive Symptoms and especially scores on the BPRS are less affected by delusional symptoms alone (e.g., only one of the 18 items on the BPRS addresses delusions). As expected, the regression analysis with turning behavior as a predictor of total score on the Scale for the Assessment of Positive Symptoms was in the expected direction and was nonsignificant ($F=0.85$, $df=1, 18$, $p=0.18$; $r=-0.21$). Also as expected, turning behavior did not predict total BPRS score ($F=0.07$, $df=1, 18$, $p=0.39$; $r=0.06$).

FIGURE 1. Left Turning as a Predictor of Delusional Ideation in 20 Neuroleptic-Free or Neuroleptic-Naive Psychotic Subjects



DISCUSSION

This study demonstrated a statistically significant relation between severity of delusions and left-turning behavior (right hemispatial inattention) in a group of 20 psychotic patients. Our results are consistent with reports of left-turning behavior (1) and other subtle forms of right hemispatial inattention (2, 3) in unmedicated and medication-naive patients with schizophrenia. The present study, however, had a different purpose. By design, it included both severely delusional and nondelusional schizophrenic patients. This wide range of severity of delusions permitted us to demonstrate the correlation of the two (presumably dopamine-related) phenomena.

Hemispatial inattention and delusional symptoms often appear together in neurological patients (12–14). As has been pointed out elsewhere, two neurological conditions that can produce psychotic states in humans (right frontoparietal pathology and left amygdala kindling) have been shown to result also in left-turning behavior (13, 15). Studies also associate such persistent attentional asymmetry with severe bilateral cortical pathology or cortical immaturity (5, 12, 14), and some have speculated that hemispatial inattention is a key concept for understanding the neurology of psychosis (13, 15). Being a sign, rather than a symptom, hemispatial inattention may often be easier to document than delusions in a psychotic patient. Ongoing studies are examining the potential value of hemispatial inattention in predicting response to dopamine blockers and outcome in psychosis.

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