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Cognitive Performance after using Atypical Medication in a Drug-Free Bipolar

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Abstract

Bipolar Disorder (BPD) is a complex disorder and it is essential to understand the mechanisms underlying the disease stages. We present a case report of a 25-year-old male patient was diagnosed with type 1 BPD according to the DSM-5 and the SCID for DSM-5. He was referred to a private clinic because of complaints of persecutory delusions, mystical delirium, and hallucinations. An extensive medical assessment was performed and the patient was tested for some cognitive functioning, using the Stroop Color-Word Interference (SCWI) and the Trail-Making Test (TMT) parts A and B. Both tests were used to measure some aspects of cognition, such as attention, cognitive flexibility, inhibition, and information processing speed. Slower reaction times indicated better performance. Ziprasidone monotherapy (80 mg/day) was prescribed once daily for 8 weeks. A reduction (i.e., improvement) of 25% and 46% were observed for the congruent and incongruent reaction times of the SCWI; a reduction (i.e., improvement) of 20% and 35% were observed for the TMT-A and TMT-B, respectively. This improvement was observed after only two months of treatment with Ziprasidone. The assessment of this participant in a drug-free moment was critical to establish the possible causal relationship between medication and improvement. Future studies are needed comparing the cumulative effects of medication, illness duration, and the frequency of shifts between mood states as variables affecting the cognition.

Introduction

Bipolar disorder (BPD) is characterized by shifts between different mood states (mania and depression) interleaved with periods of normal mood, or euthymia. BPD can be classified into type 1, type 2 and cyclothymia. Type 1 BPD is marked are marked by repeated manic episodes and the need for a careful treatment [1]. Although the gold standard treatment for BPD is the use of mood stabilizers, some patients can use atypical antipsychotics (e.g., Ziprasidone) due to its adherence and the possibility to reduce the repeated manic episodes. Since mood shifts in BPD can increase symptom severity, it is essential to understand the mechanisms underlying the disease stages.

Studies have shown that atypical antipsychotics can also improve some visual and cognitive functions for schizophrenia, which shares similar genetic basis with BPD [2,3]. Here, we present a rare case report of a patient treated with atypical antipsychotics that have improvement in cognitive tasks.

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Case report

A 25-year-old male patient was diagnosed with type 1 BPD according to the DSM-5 and the SCID for DSM-5. This patient also had no history of neurological or cardiovascular disease, head trauma, chronic contact with such substances as organic solvents or comorbidities. The patient had no ocular disease, based on fundoscopic and optical coherence tomography examinations and was screened for color blindness. They had normal or corrected-to-normal vision as determined by visual acuity of at least 20/20 measured by the Snellen eye chart. The study followed the recommendations of the Declaration of Helsinki.

Neuropsychological measures

One of the tests used in the present study was the Stroop color-word test. The Stroop color-word test is considered one of the gold standards for the assessment of attentional measures, being one of the most used instruments in clinical and experimental neuropsychological environments [4]. In addition, it is considered one of the most extensive tests, since it has a large number of specific norms considering the different sociodemographic and cultural conditions of individuals [4,5].

The Trail-Making Test (TMT) part A and B was also applied. The TMT assesses cognitive measures and is measured by completion time and number of errors, with lower scores indicating better performance. TMT-A seeks to connect 25 numbers in an ascending sequence. In turn, TMT-B seeks to connect 25 numbers and letters in an alternating sequence[6]. Both tests were used to measure some aspects of cognition, such as attention, cognitive flexibility, inhibition and information processing speed.

Procedure

The patient was referred to a private clinic for complaints of persecutory delusions, mystical delusions, and hallucinations. An extensive medical evaluation was performed and the patient was tested for some cognitive functioning, using Stroop Color-Word Interference (SCWI) and the Trail-Making Test (TMT) parts A and B.

After the first evaluation, ziprasidone (80 mg/day) was prescribed once daily. Two months after drug administration, the patient underwent neuropsychological tests again. Slower reaction times were observed, indicating better performance in the evaluated tasks.

Results & Discussion

We present a case report that indicates improvement in cognition after two months of treatment with Ziprasidone. During the assessment, the patient performed 1.33 and 1.89 in both congruent and incongruent parts of the SCWI, and performed the TMT A and TMT B in 27.78 and 38.97 seconds, respectively. The results were associated with the YMRS, suggesting the greater severity of symptoms as an indicator of worse performance on cognitive tasks.

After adaptation to the medication, the patient came back for maintenance and, surprisingly, scored 14 in the YMRS. With this small, but interesting finding, the patient was tested again for the SCWI and the TMT A and B. His results were 0.99 and 1.02 in both congruent and incongruent parts of the SCWI; and, for the TMT he scored 22.15 and 29.23 for both parts A and B, respectively. A reduction (i.e., improvement) of 25% and 46% were observed for the congruent and incongruent reaction times of the SCWI; a reduction (i.e., improvement) of 20% and 35% were observed for the TMT-A and TMT-B, respectively.

This improvement was observed after only two months of treatment with Ziprasidone. The congruent or first part of each test had small percentages (congruent stimuli, i.e., the same color and word for the SCWI; and TMT-A, where only numbers were presented), whereas the hard ones had more improvement, with a mean percentage of almost 41%.

Previous evidence shows that patients with schizophrenia treated with ziprasidone showed improvement in cognitive domains such as episodic memory, attention/vigilance, executive function, and visuomotor speed [7]. The pharmacological profile of ziprasidone is characterized as a partial agonist with the 5-HT1A receptor, which helps to increase the release of cortical dopamine and the firing of serotonergic neurons in the dorsal region of the raphe nucleus [8,9].

Estimated occupations of Dopamine D_2 Receptor (D2R) greater than 77% were associated with impairment in general neurocognitive performance and impairments in vigilance and attention tasks [10,11]. D2R occupancy from 70% to 64% was associated with improvement in adverse effects in patients with schizophrenia [12]. Thus, it is suggested that optimal antipsychotic dosing may help to regulate dopaminergic functioning, from to help improve cognitive function.

Conclusion

The precise mechanisms by which medications may affect visual processing are not fully understood. The use of antipsychotics can alter the retina, mainly light adaptation and retinal gain control, and influence rod photoreceptor function, reaching to high-order processes like cognition. The worsening of visual or cognitive functioning when acutely manic is in agreement with some studies with BPD [3,13], all of which suggests that a transient channel abnormality may be one manifestation of mania. Unclear are the physiological ways in which the BPD patient had some improvement after the use of atypical antipsychotics, but one may argue that dopamine and serotonin receptors are directly linked to reduction of the symptoms and, hence, improvement of some abilities [2,14]. The assessment of this participant in a drug-free moment was critical to establish the possible causal relationship between medication and improvement. Future studies are needed comparing the cumulative effects of medication, illness duration, and the frequency of shifts between mood states as variables affecting the cognition.

Conflict of interest: There were no conflict of interests.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Availability of data and materials: Not applicable.

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