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Sustained attention deficits in manic and euthymic patients with bipolar disorder

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Abstract

Sustained attention deficits are proposed to be both state and trait indicators of bipolar disorder. The nature of these deficits and their association with medication and symptoms is not clear yet. The aim of this study was to investigate the impairments in various components of sustained attention task in euthymic and manic patients and was to investigate the relationship between the deficits in the manic state and medication effects. The performances of 37 manic patients, 34 euthymic patients with bipolar disorder and 34 control subjects on eight scores from Conners' CPT II, reflecting three different dimensions of sustained attention were compared. Similar to some recent findings, euthymic patients had decreased target sensitivity (omission errors) and response time inconsistency. The increased false responding (commission errors), perseveration and vigilance deficits were prominent in the manic patients. These state dependent impairments could not be explained by the impact of medication. In contrast, the exacerbation of seemingly trait-related impairments in the manic state can be at least partly explained by the impact of pharmacological therapy.

Keywords: Bipolar disorder; Euthymia; Mania; Sustained attention

1. Introduction

Neurocognitive dysfunction in the discrete phases of bipolar disorder (BPD) is increasingly being reported. Besides manic and depressive episodes, cognitive deficits are also reported to persist in remitted patients with bipolar disorder. Executive function, verbal memory and sustained attention deficits are among the most commonly reported impairments in bipolar disorder (Glahn et al., 2004; Quarishi and Frangou, 2002; Savitz et al., 2005; Thompson et al., 2005). Studying the neurocognitive dysfunction in bipolar disorder can provide a potential link from the neuropsychological symptoms of the disorder to the underlying neurobiological mechanisms.

Continuous performance tests (CPT) are used to assess sustained attention and vigilance. Several studies reported decreased target sensitivity (omission errors) in various CPT tasks in euthymic patients with bipolar disorder (Bora et al., 2005; Clark et al., 2002; Clark and Goodwin, 2004; Liu et al., 2002; Swann et al., 2003) although some other studies did not replicate these results (Bozikas et al., 2005; Robertson et al., 2003). Bozikas et al. reported sustained attention deficits in patients with schizophrenia but not in euthymic patients with bipolar disorder. There is also some evidence for decreased target sensitivity and increased false responding in acute mania (Clark et al., 2001; Clark and Goodwin, 2004; Liu et al., 2002; Sax et al., 1998). The samples in these studies were small. In these studies, several different versions of CPT; RVIP (Rapid Visual Information Processing task) (Clark et al., 2001), degraded-stimulus CPT (Liu et al., 2002) and IMT–DMT (Immediate Memory Test–Delayed Memory Test) (Swann et al., 2003) were used. In several of these studies, the CPT performances of euthymic and manic bipolar patients were also compared (Fleck et al., 2005;Liu et al., 2002; Swann et al., 2003). Increased false responding was prominent only in the manic state. These studies failed to find a correlation between target sensitivity and the severity of mania, however, their sample sizes were small.

Abbreviations: ADHD, attention deficit/hyperactivity disorder; BPD, bipolar disorder; CPT, continuous performance tests; HDRS, Hamilton depression rating scale; ISI, inter-stimulus interval; RT, reaction time; RVIP, rapid visual information processing task; UKU, Udvalg ter Kliniske Undersogelser; YMRS, Young mania rating score.

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Some authors propose that the decreased target sensitivity may be a vulnerability indicator of bipolar disorder. This impairment may be exacerbated in the manic state and is accompanied by an increased rate of false responding (Clark and Goodwin, 2004). This cognitive profile suggests a trait-related impairment which is modulated by state. In this study, the sustained attention deficits were found to be unrelated to the dose and the type of the medications.

One of the objectives of the study was to compare the performances of euthymic and manic bipolar patients on three dimensions of sustained attention and to try to differentiate impairments of euthymic patients from state dependent deficits. Our first hypothesis was that decreased target detection and reaction time (RT) inconsistency would be present even in euthymic patients and we suggested that these impairment would be exacerbated during mania. In addition to these impairments, we expected that manic patients would also have attention impairments in impulsivity and vigilance dimensions of the task. Originally, the performances of manic patients on some new attentional measures like perseveration and reaction time inconsistency were investigated.

Another objective was to investigate the relationship between the attention deficits in manic state and medication effects. Clark and Goodwin investigated the association of attention deficits with the type and dose of the medications. As an original contribution of this study, we also used the sedation scores of the manic patients as an indirect indicator of the impact of pharmacological treatment on attention. We hypothesized that exacerbation of trait-related impairments in mania could be explainable, at least partly, by the impact of treatment.

2. Method

2.1. Participants

Before the administration of the sustained attention task, all of the manic patients were assessed with Young Mania Rating Score (YMRS) and sedation item of the UKU (Udvalg ter Kliniske Undersogelser) scale (Lingdaerde et al., 1987). The euthymic patients were assessed by Hamilton Depression Rating Scale (HDRS) (Akdemir et al., 2001; Hamilton, 1960) and YMRS (Karadag et al., 2002; Young et al., 1978). Clinical variables were collected by psychiatric interview and by review of the Affective Disorder Unit charts and inpatient files. These assessments were performed by a psychiatrist who had extensively used the same assessment measures in similar studies for the last three years (E.B). A history of medical disorders, head trauma and substance abuse were the exclusion criteria for both the group of patients and the control subjects. Manic patients in partial remission were excluded from the study (YMRS <13).

The manic patients were all inpatients in the wards of the Ege University Department of Psychiatry. Inclusion criteria for these patients were that they were described as cooperative by the ward staff and were still experiencing a manic episode. The patients were identified through the visits to the wards and consultation with the ward staff. Forty-nine of the patients who were considered suitable by the ward staff were assessed. Forty-seven of the patients met DSM-IV criteria for bipolar I disorder, manic episode. Five patients were considered as in partial remission and one patient had comorbid alcohol dependence. Four patients could not complete the protocol of the study. The remaining 37 patients were included in the study. Thirty of these patients (80%) were hospitalized with a psychotic mood episode. Thirty-four euthymic patients with bipolar disorder were recruited from the outpatient clinic of the Affective Disorders Unit of Ege University. Cut off scores of the current symptoms to define euthymia (YMRS <6 and HDRS <7) were similar to previous studies (Bora et al., 2005; Clark et al., 2002). All of the euthymic patients were in remission for at least four months. Twenty of these patients had a history of at least one psychotic episode (59%).

All of the manic patients were receiving mood stabilizing medication. Twenty-three of them were taking lithium, six were taking valproic acid and eight of them were taking lithium plus valproic acid combination. The mean dose of lithium was 1419± 394 mg/day and the mean dose of valproic acid was 1250± 320 mg/day. Thirty-one of the manic patients were receiving additional antipsychotic medication (mean dose=512.5 mg of chlorpromazine equivalent). Twenty of them were receiving atypical and 11 of them were taking typical antipsychotics. The conversion method of antipsychotics to chlorpromazine equivalents was based on reported minimum effective dose equivalence ratios to haloperidol (Woods, 2003). Twenty-one of the patients were also taking lorazepam (mean dose=4.4 mg/day).

All of the remitted patients were receiving lithium (mean dose=1039±237 mg/day). Additionally, seven of these patients were taking valproic acid (mean dose=1035±466 mg/day) and two of them were taking carbamazepine (700±424 mg/day). Three of the patients were taking atypical antipsychotics and two of them were taking low dose antidepressants.

A control group consisting of thirty-four normal volunteers with similar educational background were included in the study. The patients and control subjects were also matched for age. Control subjects had no history of psychiatric treatment or familial history of psychotic or affective disorders.

2.2. Sustained attention task

2.2.1. Conners continuous performance test (CPT-II)

Respondents are required to press the space bar when any letter except “X” appears. The inter-stimulus intervals are 1, 2 and 4 s with a display time of 250 ms. There are 6 blocks, with 3 sub-blocks, each containing 20 trials. The procedure takes 14 min to complete. Eight types of scores were used in the study. Also, the response styles of the three groups were compared using Beta statistics (Conners’ Continuous Performance Test-II Manual, 2000). All subjects were practised before taking the test.

1- Omission errors: Number of targets to which the individuals did not respond.
2- Commission errors: The number of times the individual responded to a nontarget (X).
3- Hit reaction time: Mean response time (milliseconds) for all target responses over all six trial blocks.