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ScienceDirect
Comprehensive Psychiatry 52 (2011) 378–385
Comprehensive PSYCHIATRY
www.elsevier.com/locate/comppsych

Impulse control disorder comorbidity among patients with bipolar I disorder

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Abstract

Objective: Impulsivity is associated with mood instability, behavioral problems, and action without planning in patients with bipolar disorder. Increased impulsivity levels are reported at all types of mood episodes. This association suggests a high comorbidity between impulse control disorders (ICDs) and bipolar disorder. The aim of this study is to compare the prevalence of ICDs and associated clinical and sociodemographic variables in euthymic bipolar I patients.

Method: A total of 124 consecutive bipolar I patients who were recruited from regular attendees from the outpatient clinic of our Bipolar Disorder Unit were included in the study. All patients were symptomatically in remission. Diagnosis of bipolar disorder was confirmed using the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*. Impulse control disorders were investigated using the modified version of the Minnesota Impulsive Disorders Interview. Impulsivity was measured with the Barratt Impulsiveness Scale Version 11. Furthermore, all patients completed the Zuckerman Sensation-Seeking Scale Form V.

Results: The prevalence rate of all comorbid ICDs in our sample was 27.4% (n = 34). The most common ICD subtype was pathologic skin picking, followed by compulsive buying, intermittent explosive disorder, and trichotillomania. There were no instances of pyromania or compulsive sexual behavior. There was no statistically significant difference between the sociodemographic characteristics of bipolar patients with and without ICDs with regard to age, sex, education level, or marital status. Comorbidity of alcohol/substance abuse and number of suicide attempts were higher in the ICD(+) group than the ICD(−) group. Length of time between mood episodes was higher in the ICD(−) group than the ICD(+) group. There was a statistically significant difference between the total number of mood episodes between the 2 groups, but the number of depressive episodes was higher in the ICD(+) patients as compared with the ICD(−) patients. There was no statistically significant difference between the age of first episode, seasonality, presence of psychotic features, and chronicity of illness. A statistically significant difference was observed between the ICD(+) and ICD(−) groups in terms of total impulsivity, attention, nonplanning, and motor impulsivity scores as determined by the Barratt Impulsiveness Scale Version 11.

Conclusion: The present study revealed that there is a high comorbidity rate between bipolar disorder and ICDs based on *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision,* criteria. Alcohol/substance use disorders, a high number of previous suicide attempts, and depressive episodes should alert the physician to the presence of comorbid ICDs among bipolar patients that could affect the course and treatment of the disorder.

1. Introduction

Impulsivity is an important feature of many psychiatric disorders, including impulse control disorders (ICDs), mood disorders, substance abuse, and eating disorders [1,2]. Among the various mood disorders, impulsivity is found to be particularly closely associated with bipolar disorder (BD) [3-12]. Impulsivity as a feature of BD is related to impairment of mood stability, increased behavioral problems, and action without planning. Impulsivity appears to be prominent during manic episodes but may also be found during euthymia and other mood states in patients with BD [12]. Swann et al [11] reported that euthymic bipolar patients have significantly higher impulsivity scores than do control subjects.

Increased impulsivity levels suggest an increased rate of comorbid ICDs in patients with BD. Bipolar disorder and ICDs have both some common and some distinct features. Risky behavior, impulsivity, poor insight, and affective instability are common phenomenological symptoms in both

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0010-440X/$ – see front matter © 2011 Elsevier Inc. All rights reserved.
doi:10.1016/j.comppsych.2010.08.004

disorders. Both disorders start in adolescence or early adulthood and subsequently follow episodic and/or chronic courses [7,13]. Similar comorbidity patterns, abnormalities of central serotonin and noradrenaline neurotransmission [7], and positive response to mood stabilizers [14-21] and antidepressant drugs [22-30] are the other common features. Another finding supporting a possible ICD-BD relationship is the increased prevalence of mood disorders in patients with ICDs and the increased prevalence of ICDs in patients with BD [7]. The lifetime prevalence rate of ICDs among patients with mood disorders ranges between 23% and 35%, which are much higher than those rates reported in the general population (8.9%) [2,31,32]. In addition, in one study conducted in patients with kleptomania, 60% of the cases were reported to have comorbid BD [7,33]. In another study, the same group of researchers identified lifetime ICD comorbidity in 9 (13%) of 71 bipolar patients with manic episodes [10].

We have found no published studies investigating the rates of ICDs among bipolar patients as their primary focus. The available data are findings that are extracted as secondary results from conducted studies. Therefore, the present study was conducted to determine the prevalence of ICDs and associated clinical and sociodemographic variables in a sample of bipolar I outpatients. In particular, we proposed the following: (*a*) to estimate the prevalence of lifetime ICDs (pathologic gambling [PG], pyromania, kleptomania, trichotillomania, intermittent explosive disorder [IED], compulsive buying [CB], compulsive sex disorder, compulsive exercise, and pathologic skin picking) in a sample of euthymic bipolar I outpatients and (*b*) to compare BD-I patients with and without comorbid lifetime ICDs on sociodemographic variables, onset and duration of illness, presence of comorbid Axis I disorders, general features of the disorder, nature of first mood episode, and levels of impulsivity and sensation seeking. We hypothesized that because of the impulsivity symptoms inherent in BD, bipolar patients would have higher lifetime prevalence rates for ICDs as compared with the healthy population. Furthermore, we expected that these rates would be higher for certain ICDs such as PG, trichotillomania, and CB, which are 3 ICD subtypes reported to be closely associated with mood disorders.

2. Method

2.1. Study setting and subjects

The sample included 124 consecutive adult patients (63 female, 61 male) between 18 and 65 years of age who were recruited from the outpatient clinic of the Bipolar Disorder Unit at the Department of Psychiatry, Cukurova University Medical School. The study was conducted between September of 2006 and January of 2008. The Hospital of Cukurova University Medical School is a hospital located in Adana, in the south of Turkey, and serves a population of 3 million people throughout the urban area and surrounding provinces.

The patients included in the study had already received a diagnosis of BD type I according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV*), *Text Revision* [2], and were symptomatically in remission (Young Mania Rating scale score <12, Hamilton Depression Scale score <8) during the month before the onset of the study. Excluded from the study were those potential subjects who showed confusion, agitation, or any cognitive disorder, such as delirium or dementia, at the time of initial assessment; those who were unable to cooperate for the psychiatric interview and other assessments; or those who did not give written consent to participate in the study.

Of the 141 patients approached, 7 were excluded from the study because they were not in remission during the last month; and another 10 did not give informed consent to participate in the study. The resulting sample size was 124 patients. After approval of the study by the institutional review board, written informed consent was obtained from all participants.

All patients included in the study were on mood stabilizer medications at the time of inclusion, either as monotherapy or as combination therapy. Of the 124 patients included in the study, 75 were on lithium monotherapy, 24 were on lithium and valproate combined therapy, 12 were on lithium and carbamazepine therapy, 7 were on triple therapy (lithium, valproate, carbamazepine), and 4 were on lithium and lamotrigine therapy. Moreover, 24 (15%) of the patients were on valproate and 13 (8%) were on carbamazepine monotherapy. In addition to mood stabilizer treatments, 36 patients were taking long-term atypical antipsychotic medications as adjunctive mood stabilizers, 21 were on olanzapine, 8 were on risperidone, and 7 were on quetiapine.

2.2. Procedures and assessment instruments

Patient assessment took place in 2 phases: an initial 2 to 2 1/2 hours of diagnostic and clinical interviews by a staff psychiatrist followed by a half hour of testing. Before the testing, all patients were interviewed using the Turkish version of the Structured Clinical Interview for *DSM-IV* (SCID-I) to confirm the diagnosis of BD and other comorbid Axis I disorders. A modified Turkish version of the Minnesota Impulsive Disorders Interview (MIDI) [34] was administered to search for lifetime ICD diagnoses. The SCID-I examines both current and lifetime Axis I psychiatric disorders according to the *DSM-IV* [35]. In the current study, we estimated the lifetime prevalence rates for Axis I disorders according to the SCID-I. For a diagnosis of BD, patients must have had at least one full manic, hypomanic, or mixed episode not attributable exclusively to substance abuse, medical disorders, or other psychiatric illnesses. To prevent confounding factors that arise during the active phase of BD, such as the inability to cooperate with the interviewer, increased deficits in cognitive functioning, or

impaired memory recall due to illness or the use of antipsychotics, only patients in remission during the last month were included. Along with the SCID-I interview, a detailed psychiatric interview was conducted to obtain further information regarding the course of illness, sociodemographic features, and familial and medical history. Clinical data collected included age of onset of the disorder, frequency and type of affective episodes, number of hospitalizations, type of first mood episode, and presence of seasonal and psychotic patterns associated with the affective episodes. Patient hospital records containing such information as hospital admissions, life charts, and follow-up notes were examined to establish the timing of past affective episodes and the presence of a possible seasonal pattern in the episodes.

As indicated above, in the final part of the initial study phase, we searched for lifetime prevalence rates of ICDs. The presence of lifetime ICDs were evaluated with a modified Turkish version of the MIDI [36] and an assessment using the *DSM-IV* criteria. The MIDI is a 36-item semistructured interview that includes separate screening modules for exploring the *DSM-IV* criteria for ICDs (ie, PG, IED, trichotillomania, kleptomania, pyromania, CB, compulsive sexual behavior [CSB], and compulsive exercise). In the MIDI, for ICDs already covered in the *DSM-IV*, patients were asked questions mirroring the *DSM* criteria after a general screening question was answered in the affirmative. However, for the other disorders not included in the *DSM* (ie, CB, CSB, and compulsive exercise) but reviewed under the rubric of the ICD–not otherwise specified (NOS), the questions in the MIDI determine the presence of increasing tension before the related act followed by relief after the completion of the act, the level of distress, and the presence of functional impairment.

In the second phase of the assessment, lasting approximately one-half hour, patients completed 2 self-report questionnaires: the Turkish versions of the Barratt Impulsiveness Scale version 11 (BIS-11) [37] and the Zuckerman Sensation-Seeking Scale Form V (SSS) [38]. These questionnaires evaluate different aspects of impulsivity and sensation seeking. The BIS-11 [39] is a self-report questionnaire that uses a 3-factor impulsivity model that includes both motor and cognitive impulsivity. The BIS-11 includes 30 items grouped into 3 subscales: attentional (inattention and cognitive instability), motor (motor impulsiveness and lack of perseverance), and nonplanning (lack of self control and intolerance of cognitive complexity). The evaluation of the BIS-11 gives 4 different subscores: total score, nonplanning activity, attentional (cognitive) impulsivity, and motor impulsivity. The Turkish version of the BIS-11 has been found to be valid and reliable, presenting similar psychometric properties to the original version of the BIS-11.

The SSS [40,41] is composed of four 10-item subscales: thrill and adventure seeking (TAS), experience seeking (ES), disinhibition (DIS), and boredom susceptibility (BS). These subscales may be administered in isolation or as part of a test battery and may be folded into a total score. The TAS subscale evaluates involvement in sports or physically risky activities (such as parachuting or scuba diving); the ES subscale evaluates the desire to engage in novel experiences (such as music and art); the DIS subscale evaluates social sensation seeking through drinking, sex, and parties; and the BS subscale evaluates intolerability toward repetitive, routine, and familiar occurrences [41]. The total score provides an overall assessment of sensation seeking. In the Turkish adaptation study of the scale, Ongel [38] concluded that the Turkish version of the scale had sufficient reliability.

2.3. Statistical analysis

Descriptive statistical analyses were carried out for the evaluation of demographic and clinical characteristics of the entire group. χ^2 test and Fisher exact test were used to analyze categorical variables, and *t* tests were used for the comparison of parametric continuous variables. In comparing the groups with and without ICDs, the nonparametric Mann-Whitney *U* test was performed for continuous variables, as the data were not normally distributed. For prevalence rates of ICDs in this sample, 95% confidence intervals were provided. All *P* values were 2-tailed, and statistical significance was set as $P < .05$.

3. Results

The sample included 124 consecutive adult patients who were recruited from regular attendees of the outpatient clinic of the Bipolar Disorder Unit of the Department of Psychiatry, Cukurova University Medical School. The majority of the sample was between 20 and 45 years of age. The sex distribution of these patients was equal. All patients received a diagnosis of BD-I. The majority of the patients were high school graduates, single, and unemployed.

The prevalence rate for all comorbid ICDs in this sample was 27.4% (n = 34). Table 1 presents the lifetime prevalence rates for all ICDs. The most common ICD subtype was pathologic skin picking (10.5%), followed by CB, IED, and trichotillomania. There were no cases meeting the criteria for

Table 1
Lifetime prevalance of ICDs among patients with BD

ICD	n	%	95% CI (%)
Any ICD	34	27.4	19.2-34.8
Kleptomania	1	0.8	0.0-2.4
PG	4	3.2	0.1-6.3
IED	8	6.5	2.1-10.7
Pyromania	0	0	–
Trichotillomania	8	6.5	2.1-10.7
ICD-NOS	21	16.9	9.5-22.4
CB	9	7.3	2.7-11.8
CSB	0	0	–
Compulsive exercise	1	0.8	0-2.4
Pathologic skin picking	13	10.5	4.7-15.3

CI indicates confidence interval.

Table 2
Sociodemographic and clinical characteristics of bipolar patients with and without comorbid lifetime ICD

Features	ICD (+) (n = 34)	ICD (−) (n = 90)	t/χ	P
Age	35.9 (12.0)	33.1 (10.2)	1.372	.173
Sex			0.00	1.00
Male	17 (50)	45 (50)		
Female	17 (50)	45 (50)		
Education level			3.903	.272
Elementary	1 (2.9)	14 (15.6)		
Secondary	14 (41.2)	29 (32.2)		
Higher education	19 (55.9)	47 (52.2)		
Duration of education (year)	13.7 (2.5)	12.8 (3.7)	1.370	.173
Marital status			1.522	.217
Married	17 (50)	34 (37.8)		
Single/divorced	17 (50)	56 (62.2)		
Employment			1.294	.255
Employed	19 (55.9)	40 (44.4)		
Unemployed	15 (44.1)	50 (55.6)		
Nature of initiation of 1st episode			3.294	.070
Rapid	14 (43.8)	56 (62.2)		
Slow	18 (56.2)	34 (37.8)		
Total no. of episodes	5.6 (4.6)	4 (2.6)	2.455	.016
No. of manic episode	2.29	2.43	−0.348	.729
No. of depressive episode	2.32	0.99	3.706	<.01
No. of hypomanic episode	0.82	0.50	1.033	.304
No. of mixed episode	0.18	0.1	0.962	.338
Age at 1st episode	25.6 (8.7)	23.8 (8.3)	1.031	.305
Age at 1st suicide attempt	22 (7.1)	25.4 (9.6)	−0.829	.416
Life event at 1st episode	15 (44.1)	34 (37.8)	0.415	.519
Psychosis at 1st episode	18 (52.9)	50 (55.6)	0.068	.794
Suicide attempt at 1st episode	4 (11.8)	7 (7.8)	0.485	.486
Hospitalization at 1st episode	15 (44.1)	46 (51.1)	0.483	.487
Type of 1st episode			2.505	.474
Mania	21 (61.8)	47 (52.2)		
Hypomania	3 (8.8)	4 (4.4)		
Depressive	9 (26.5)	36 (40)		
Mixed	1 (2.9)	3 (3.3)		
Mean duration of episode	47.5 (25.7)	45.4 (28.3)	0.384	.702
Interepisodic remission	29 (87.9)	88 (97.8)	5.099	.024
Chronic course	5 (14.7)	11 (12.2)	0.135	.713
History of manic switch	6 (17.6)	11 (12.2)	0.614	.433
Seasonality	22 (64.7)	50 (55.6)	0.849	.357
Psychotic features	21 (61.8)	61 (67.8)	0.398	.528
No. of suicide attempt	2.1 (1.7)	1.2 (0.8)	2.359	.024
Lifetime suicide attempt	10 (29.4)	20 (22.2)	0.695	.404
Aggressiveness	16 (47.1)	30 (33.3)	1.992	.158
Familial psychiatry history	18 (52.9)	49 (54.4)	0.022	.881
Comorbidity				
Anxiety disorders	13 (38.2)	39 (43.3)	0.263	.608
Somatoform disorders	6 (17.6)	6 (6.7)	3.404	.065
Alcohol/substance abuse	10 (29.4)	10 (11.1)	6.110	.013

t/χ indicates t value or χ^2 value, respectively.

pyromania or CSB. Of the 34 patients with a lifetime ICD diagnosis, 27 had 1 ICD, 6 had 2, and 1 patient had 3 lifetime comorbid ICDs diagnoses. The patient with 3 ICDs met diagnostic criteria for IED, pathologic skin picking, and compulsive exercise.

The sociodemographic and clinical characteristics of the bipolar patients with and without lifetime comorbid ICDs are presented in Table 2. There was no statistically significant difference between the sociodemographic characteristics of bipolar patients with and without ICDs with regard to age, sex, education level, or marital status. Comorbidities of alcohol/substance abuse and suicide attempts were higher in the ICD(+) group than in the ICD(−) group. The length of time between episodes was higher in the ICD(−) group than in the ICD(+) group. There was statistically significant difference between the total number of mood episodes between the 2 groups. Furthermore, the number of depressive episodes was higher in the ICD(+) patients as compared with the ICD(−) patients. There was no statistically significant difference between the age of first episode, seasonality, presence of psychotic features, or chronicity of illness.

Table 3
Comparison of impulsivity and sensation-seeking scores of bipolar patients with and without lifetime ICD

	ICD(+)	ICD(−)	t/χ	P
BIS total	70.1 (11.1)	65.8 (9.7)	2.134	.035
BIS nonplanning	25.9 (5.1)	25.9 (5.3)	−0.086	.931
BIS motor	23.4 (5.5)	20.7 (4.4)	2.771	.006
BIS attention	20.7 (2.7)	19.1 (2.7)	2.985	.003
SSS (total)	11.8 (4.5)	10.8 (5.2)	0.970	.334
TAS	4.3 (2.4)	4.3 (2.9)	−0.004	.997
ES	3.0 (1.2)	2.5 (1.4)	1.687	.094
DIS	2.4 (1.8)	1.7 (1.4)	2.338	.021
BS	2.1 (1.1)	2.3 (1.7)	−0.642	.522

The BIS-11 and SSS scores for the bipolar patients with and without lifetime comorbid ICDs are presented in Table 3. A statistically significant difference was observed between the ICD(+) and ICD(−) groups in terms of total impulsivity, attention, nonplanning, and motor impulsivity scores as determined by the BIS-11. The general factor and subscale scores (ie, TAS, BS, ES) on the SSS did not show any statistical differences between the ICD(+) and ICD(−) groups. There was a statistically significant difference between the 2 groups on the DIS subscale score of the SSS.

4. Discussion

The present study revealed that 27.4% of bipolar I patients had at least one comorbid ICD based on *DSM-IV* criteria. These results are consistent with previous studies reporting elevated rates of ICDs in patients with mood disorders. In the literature, the lifetime prevalence of all ICDs in patients with mood disorders has been reported to range between 23% and 35% in psychiatric inpatients [2,31]. Strakowski et al [42] reported the comorbidity of all ICDs to be 23% in patients with affective psychosis. In one study, McElroy et al [10] demonstrated ICD comorbidity in 9 (13%) of 71 bipolar patients (47 manic and 24 mixed episode). There was no significant difference in ICD prevalence rates for the different BD subtypes. In a recent study, Issler et al [43] used specific modules to investigate

ICDs in a small group of BD patients with obsessive-compulsive disorder (OCD). Of 15 patients in the BD + OCD group, 9 (60%) had at least one ICD, compared with only 2 (13%) of those in the BD/no-OCD group. Overall, 11 (36.7%) of 30 BD patients had at least one ICD; this result is consistent with our findings. Drawing attention to common features of these 3 different disorder entities, many authors have emphasized the need for additional research to examine the complex interplay between ICD, OCD, and BD.

4.1. The prevalence rates of individual ICDs

In the current study, which utilized the *DSM-IV* criteria to diagnose ICDs, the most common comorbid ICD type was ICD-NOS (ie, skin picking, CB) (16.9%), followed by IED (6.5%) and trichotillomania (6.5%). Pathologic skin picking (10.5%) and CB (7.3%) were the most common ICD-NOS types. This finding is in parallel with a study by Issler et al [43] in which skin picking and onychophagia (8 of 30 BD cases; 26.7%) were the most common ICDs among BD patients followed by kleptomania (5 of 30; 16.6%).

Compulsive buying, the second most frequent comorbid ICD in our sample, is accepted as a common psychiatric disorder with a prevalence rate in the general population from 1.8% to 16% according to diagnostic criteria used [44,45]. In several studies, it has been reported that 21% to 100% of patients with CB have also received at least one mood disorder diagnosis, especially major depressive disorder [46-48]. Lejoyeux et al [46,49] emphasized the close relation between negative affective layouts, particularly depressive thoughts, and patients' behaviors. In their research, the act of buying had an effect similar to that generated by antidepressant anxiolytic medication use. From another perspective, CB might lead to hypomanic symptoms by acting as an antidepressant. The hypomanic-like affect patients experience via shopping and the high comorbidity with BD in several studies have also suggested the possible association between CB and BD [47,50]. Therefore, the high comorbidity rates of CB in bipolar patients, even between mood episodes, should not be surprising.

The prevalence rates for several ICDs (IED, trichotillomania) with BD cases were comparable to rates in the general population [51-53]. The lifetime prevalence of IED in our current sample is 6.6%, a rate that is quite similar to the IED prevalences reported for the general population (range, 1.1%-7.3%) [51]. There are no robust data investigating the comorbidity between IED and BD in the available literature. McElroy et al [7] state that there is only modest empirical support for a relationship between IED and BD, which might explain similarities between general population and the rate we found in the current study.

Similarly, the presence of trichotillomania in our study (6.5%) is consistent with rates described in previous reports and is higher than rates in general population. Mood disorders and BD are reported to be present 59% and 5% of the time in patients with trichotillomania, respectively [7]. In one study, the lifetime prevalence of trichotillomania among college students was reported to be 0.6%. In the same study, when tension and dread in advance of plucking and relief and satisfaction after plucking were discarded from the diagnostic criteria, the prevalence rate rises to 1.5% to 3%. Hair plucking was reported by 10% to 13% of the students as well [52]. In another study, which was performed in Jerusalem in 1995, the lifetime prevalence of trichotillomania in the general population of youth was found to be 1% [53]. From an opposite perspective, our findings support the close relationship between trichotillomania and BD, which is a type of mood disorder.

There are many findings associated with comorbidity of mood disorders and ICD, especially PG. This association has been found in several studies of patients with PG [3]. The prevalence of major depressive disorder is particularly high in PG patients (28%-76%) [2,54-56]. In these patients, the frequency of BD is as high as 31% [7]. However, when comparing rates from the opposite perspective, the prevalence rates of PG are relatively low in mood disorders. In one study, the comorbidity rate of PG in patients with depressive disorders was reported to be 3.2% [57]. In one Canadian study, problem gambling prevalence was reported to be 6.3% in bipolar patients, although this research did not specifically assess PG [58]. In our study, the lifetime prevalence of PG was 3.2%, which is similar to the prevalence in patients with depression but relatively lower than the rate in the general population.

There are several previous reports indicating a strong relationship between kleptomania and BD; however, this same association was not found in the current study [33,43]. In one study, all of the 20 patients with kleptomania met the *DSM, Revised Third Edition,* criteria for lifetime prevalence of mood disorders; and 12 (60%) met the criteria for BD [33]. These rates suggest a high rate of comorbidity between kleptomania and BD. However, in our study, we found only one patient with kleptomania in our sample of bipolar patients. This lack of an association was assumed to emerge from a community bias against kleptomania and vague definitions of symptoms held by the patients. We suggest similar reasons for the absence of an association in the study between CSB and BD. In addition, cultural stigma and fear of degradation, which might have evaded the patients from disclosing their symptoms, could be responsible for lower rates of CSB in this sample.

4.2. Clinical features associated with ICD comorbidity

The association between BD and alcohol/substance abuse is thought to be attributable to high levels of impulsivity in both disorders [8,12]. Most patients with BD have lifetime alcohol/substance abuse. This comorbidity is associated with earlier age of onset, increased suicide risk, behavioral problems, and a more severe course of illness for BD [8]. According to the literature, impulsivity appears to be associated with susceptibility to both BD and substance

abuse. Therefore, the more impulsive patients with BD are likely susceptible to alcohol/substance abuse [59]. In our study, we found higher comorbidity rates of alcohol/substance abuse in the ICD(+) group. This result was consistent with the above notion.

Rihmer and Kiss [60] found that the lifetime prevalence of attempted suicide in patients with BD type I was 17%, a figure consistent with the rate of 24% that we found in the present study. Most studies have reported a positive relationship between impulsivity and suicide attempts in patients with BD. Increased impulsivity levels have been found in suicide attempters with BD in 2 studies that compared bipolar patients with and without history of suicide attempts [11,61]. Thereafter, Michaelis et al [62] found that there were no statistically significant differences in BIS scores between patients with a history of a single suicide attempt and those with multiple suicide attempts. Maser et al [63], in a 14-year follow-up study, demonstrated that impulsivity is one of the best long-term predictors for suicide attempt and completion in patients with mood disorders. Furthermore, suicide attempts are more frequent in patients with ICDs compared with healthy controls. In our study, we did not find a statistically significant difference with regard to the method and severity of suicide attempts between patients with and without ICDs. However, the number of suicide attempts was higher in the ICD(+) group than in the ICD(−) group in our sample. These results could be interpreted as the long-term effects of ICD comorbidities on the course, treatment, and prognosis of BD via high number of suicide attempts.

Most of the studies that investigated an association between ICDs and depressive disorders have been performed on patients with PG or with major depressive disorder [3,54-57]. The lifetime rates of depressive disorders were found to be 28% to 76% in patients with PG [54-57]. Overall, 72% of patients with PG had at least one episode of major depression and 52% had recurrent major depressive episodes [55]. In a study performed by Annagür [64], among depressive patients at a psychiatry outpatient clinic, 37% had at least one ICD comorbidity measured using *DSM* diagnoses. This number increased to 56.7% when ICD-NOS was included. Similarly, we found higher rates of depressive episodes among BD cases consistent with the presence of a relationship between depressive episodes and ICDs. In another study searching for ICDs in BD-OCD comorbidity, both higher ICD rates and higher previous depressive episodes were found in the BD + OCD than the BD/no-OCD group (average number of depressive episodes, 8.9 vs 4.1 for BD + OCD and BD/no OCD, respectively; $P < .001$) [43]. Although not discussed by the authors, the higher number of previous depressive episodes might have been a contributing factor for significant difference in that study. When all these data are reviewed, the higher frequency of depressive episodes in ICD(+) bipolar patients might be an indicator of the strong relationship between depressive disorder and ICDs.

The BIS-11 generally has been used in the majority of studies as a measurement of impulsivity for cases with BD [4-6,8,9,11]. When BIS-11 scores were reviewed by mood phase in one study, total BIS scores were found to be highest in patients during mixed episodes (BIS total, 88.7 ± 13.0) and lowest during the period between mood episodes (BIS total, 74.5 ± 15.2) [65]. In another study, Swann et al [11] found higher BIS-11 scores in euthymic bipolar patients than in controls. In a small group of bipolar patients, Peluso et al [66] reported that depressed and euthymic bipolar patients exhibit similar levels of impulsivity trait and that there is no significant relationship between impulsivity and severity of mood symptoms. Based on these findings, Peluso et al hypothesized that the relatively high level of impulsivity found in bipolar patients may be a stable component, which is not merely a manifestation of mood state. One of the limitations in our study was the absence of a control group to compare our impulsivity and sensation-seeking scores. However, we found a significant difference between the ICD(+) and the ICD(−) groups in terms of total impulsivity and attentional and motor impulsivity scores as determined by the BIS-11. Although these results are not surprising, they confirm the benefit of using the BIS-11 to identify the presence of ICD comorbidity among BD cases.

5. Conclusions

Although there is much research regarding the relationship between BD and impulsivity, data concerning the comorbidity of BD and ICDs are more limited. Available data are primarily from secondary analyses of existing data. This study is the first to investigate the prevalence of ICDs in euthymic bipolar patients. The prevalence of ICDs in this study is consistent with the literature examining the rates among patients with mood disorders. In this study, we found that alcohol and substance abuse comorbidity and suicide attempts in ICD(+) bipolar patients exceeds rates in patients without ICDs. We might interpret from these findings that ICD comorbidity increases trait impulsivity rates in bipolar patients.

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