Difference in Temperament and Character Inventory scores between depressed patients with bipolar II and unipolar major depressive disorders

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Abstract

Background: Although some core personality variables are known to be characteristic of unipolar or bipolar depression, few studies have compared the personality profile between these two disorders.

Methods: Temperament and Character Inventory (TCI) was employed to assess the personality of 36 depressed patients with bipolar II disorder (BPII), 90 patients with unipolar major depressive disorder (UP), and 306 healthy controls. The TCI was administered during the depressive episode in BPII and UP patients so that the results can be applied in a clinical setting.

Results: Significantly higher scores in harm avoidance (pb0.0001) and lower scores in selfdirectedness (pb0.0001) and cooperativeness (pb0.05) were observed in both BPII and UP patients compared to controls. Lower novelty seeking in UP patients compared to BPII patients and controls was observed in females (pb0.0001, pb0.01, respectively). A significant difference in self-transcendence score was observed between BPII and UP patients in females (pb0.0005), with higher scores in BPII (p=0.009) and lower scores in UP (p=0.046) patients compared to controls. A logistic regression model predicted BPII

in depressed females based on novelty seeking and self-transcendence scores with a

sensitivity of 89% and a specificity of 73%, but did not accurately predict BPII in

males.

Limitations: Patients in our study were limited to those receiving outpatient treatments,

and bipolar patients were limited to those with BPII.

Conclusions: Novelty seeking and self-transcendence scores of TCI might be useful in

the differentiation of UP and BPII in female patients.

Keywords: Unipolar depression; Bipolar disorder; Personality; Differential diagnosis

1. Introduction

Differentiating unipolar and bipolar depression is of great clinical importance since the treatment of the two disorders differs substantially. However, the differentiation may be difficult due to the similar depressive symptomatology in these two disorders. One study reported that 69% of bipolar disorder (BP) had been misdiagnosed, with the most frequent misdiagnosis being unipolar depression (Hirschfeld et al., 2003). Some clinical characteristics such as hypersomnia and psychotic features have been suggested to be more common in bipolar depression than in unipolar depression (Forty et al., 2008; Mitchell et al., 2001). However, there are no clear-cut clinical features that distinguish the two disorders, and clinicians must use all available information to predict the possibility of bipolarity in depressed patients.

A few studies have attempted to examine differences in personality between unipolar and bipolar depression. Two studies (Mendlowicz et al., 2005; Nowakowska et al., 2005) used the Temperament Evaluation of Memphis, Pisa, Paris, and San Diego-Autoquestionnaire (TEMPS-A) and found that cyclothymic subscale score was significantly elevated in BP patients. Another study (Lovdahl et al., 2010), which used

Temperament and Character Inventory (TCI) (Cloninger et al., 1993) to compare bipolar

II disorder (BPII) with recurrent brief depression (RBD; defined as intermittent

depressive episodes fulfilling the diagnostic criteria for major depressive episodes

except for duration, which is less than 14 days), failed to find definitive difference

between the two disorders. Evans, et al. (Evans et al., 2005) used both TEMPS-A and

TCI to find higher dysthymic, cyclothymic, irritable, anxious, and novelty seeking

temperaments and lower self-directedness and cooperativeness characters in BP patients.

A study using a battery including 17 conventional personality scales has reported

sanguine in patients with bipolar I disorder, labile or cyclothymic in patients with BPII,

and subanxious and subdepressive in patients with unipolar depression (Akiskal

et al., 2006).

Although above studies report a number of findings showing different

personality in UP and BP patients, few have assessed the personality of the two

disorders during depressive state (Mendlowicz et al., 2005). Since the severity of

depressive symptoms impact on how the subject describes their personality

(Spittlehouse et al., 2010), it is important that the mood state at the time of assessment is

taken into account. If the personality assessment is to be used as an aid for

differentiating unipolar and bipolar depression in the real world setting, studies are

required to compare personality measures during depressed mood.

In the present study, TCI was used to assess the personality difference between

depressed BPII and UP patients. TCI is a 240 item true/false questionnaire measuring

four dimensions of temperament (novelty seeking (NS), harm avoidance (HA), reward

dependence (RD), and persistence (P)) and three dimensions of character

(self-directedness (SD), cooperativeness (C), and self-transcendence (ST)), developed

on the basis of a psychobiological model of personality. Although TCI has been

frequently used in the studies of mood disorders (Akiskal et al., 2005; Celikel et al.,

2009; de Winter et al., 2007; Engstrom et al., 2004; Farmer et al., 2003; Hansenne et al.,

1999; Hirano et al., 2002; Kimura et al., 2000; Loftus et al., 2008; Marijnissen et al.,

2002; Matsudaira and Kitamura, 2006; Naito et al., 2000; Richter et al., 2000; Smith et

al., 2005), no studies to date have compared TCI score profiles of patients with unipolar

and bipolar depression during their depressed states. We aimed to identify personality

profiles specific to either unipolar or bipolar depression, which could aid in the

differentiation of the two disorders.

2. Methods

2.1. Subjects

Subjects were 36 patients with BPII (18 men, 18 women; age ± S.D. (standard

deviation)=36.3±11.1 years), 90 patients with UP (45 men, 45 women; age ±

S.D.=36.7± 10.2 years), and 306 healthy volunteers (153 men, 153 women; age ±

S.D.=36.4±11.0 years), matched for age distribution in each gender group, recruited

from the outpatient clinic of the National Center of Neurology and Psychiatry Hospital,

Tokyo, Japan or through advertisements in local free magazines, website announcement,

notices posted in the hospital, flyers, and word of mouth. Consensus diagnoses by at

least two research psychiatrists were made according to the DSM-IV criteria (American

Psychiatric Association, 1994) for BPII or UP for enrollment in the study. Those

recruited from the outpatient clinic (BPII: 24 patients (67%); UP: 66 patients (73%))

were also assessed with the Structured Clinical Interview for DSM-IV by a trained

psychiatrist to confirm the diagnosis. BPII and UP patients with Hamilton Rating Scale

for Depression (17-item version) score greater than 7 were enrolled in the study.

Healthy participants were interviewed using the Japanese version of the

Mini-International Neuropsychiatric Interview (Otsubo et al., 2005; Sheehan et al.,

1998) by a research psychiatrist, and only those who demonstrated no history of

psychiatric illness or contact to psychiatric services were enrolled as healthy controls.

Participants were excluded from both the patient and control groups if they had a prior

medical history of central nervous system disease or severe head injury, or if they met

DSM-IV criteria for mental retardation, substance dependence, or substance abuse. All

subjects were biologically unrelated Japanese who resided in the Western part of Tokyo.

Written informed consent was obtained from all subjects prior to their inclusion in the

study and the study was approved by the ethics committee of the National Center of

Neurology and Psychiatry, Japan.

2.2. Measures

All participants were administered the TCI (Cloninger et al., 1993), a 240 item true/false

self-report questionnaire measuring four dimensions of temperament and three

dimensions of character. The Japanese version of the TCI (Kijima et al., 1996; Kijima et al., 2000) was used in the present study. Each subject was allowed to take as much time as needed to complete the questionnaire. Depressive symptoms were assessed by an experienced research psychiatrist using the Japanese version of the GRID Hamilton Rating Scale for Depression, 17-item version (HDRS) (Hamilton, 1967), which has been demonstrated to show excellent inter-rater reliability (Tabuse et al., 2007).

2.3. Statistical analyses

Gender differences concerning the temperament and the character dimensions have been reported previously (Gutierrez- Zotes et al., 2004; Hansenne et al., 2005; Pelissolo and Lepine, 2000), and thus is one of the major potential confounding factors in TCI studies. Therefore, the data for male and female subjects were analyzed separately to avoid gender-dependent influence.

Statistical differences of demographic data among groups were evaluated by the chi-squared test for categorical variables and one-way analysis of variance (ANOVA) for continuous variables. Student t-test was used for comparisons of clinical

variables between BPII and UP patients. The scores of the dimensions of TCI were

compared among the three diagnostic groups using Kruskal–Wallis test, and thereafter,

pairwise comparisons between each group were done using Mann–Whitney tests.

Bonferroni method was used to correct for multiple comparisons among the three

diagnostic groups. However, since the scale scores of each TCI dimension are

intercorrelated and thus are not completely independent measures, we did not apply

Bonferroni method for the number of TCI dimensions. Correlations between TCI scores

and HDRS scores were assessed using Spearman's rank correlation coefficients. A

stepwise logistic regression analysis was used in patients with BPII and UP to determine

the optimal model for the prediction of BPII in depressive patients. Prediction models

were developed separately for males, females, and both genders combined. The

stepwise analysis was conducted as a forward stepping procedure based on a likelihood

ratio test, with pb0.05 for variable inclusion and pN0.2 for exclusion from the model.

Variables used as potential predictor variables were age, gender, HDRS score, and

scores of 7 dimensions of TCI. Nagelkerke's R2 was used to approximate the percent of

variance explained by the model (Nagelkerke, 1991). The area under the receiver

operating characteristic (ROC) curve (AUC) was also used to determine the predictive

power of the logistic model. The predicted probability with the highest Youden index

was selected as the optimal cut-off point. Statistical significance was set at two-tailed

pb0.05. Analyses were performed using the SPSS version 11.0 (SPSS Japan, Tokyo).

3. Results

Table 1 shows demographic and clinical characteristics of the subjects. Age distribution

did not differ across the three diagnostic groups. Although the average years of

education were significantly higher in the male controls, there was no significant

difference between BPII and UP patients. Patients with BPII and UP did not differ

significantly in age at onset or in HDRS scores.

The mean scores for the 7 dimensions of TCI are presented in Table 2.

Three-group comparisons of BPII, UP patients, and controls revealed differences in all

dimensions except for RD in both genders, P in females, and ST in males. Significantly

higher HA and lower SD and C scores in BPII and UP patients compared with control

subjects were observed in both males and females. Significantly higher P scores in BPII

and UP patients were detected only in females. Lower NS in UP patients compared to

BPII patients and healthy controls was observed only in females. ST scores in female

subjects showed the opposite directions between BPII and UP patients, i.e. BPII patients

scored higher and UP patients scored lower in ST compared to controls. The comparison

of ST scores in female subjects between the UP patients and controls nearly reached the

Bonferroni-corrected significance of pb0.017, and the comparisons of BPII patients

with control subjects and with UP patients remained significant after Bonferroni

correction.

The HDRS scores of UP patients were significantly correlated positively with P

in female patients (rho=0.327, pb0.05) and negatively with SD in male patients (rho=

−0.407, pb0.01). The HDRS in male BPII patient group was significantly correlated

positively with C score (rho=0.497, pb0.05). No other significant correlations were

found between TCI and HDRS scores.

Results of the stepwise logistic regression analysis are shown in Table 3. The

Nagelkerke R2 values show that 8.7%, 40.3%, and 24.1% of the variance are explained

by the models for males, females, and both genders combined, respectively. The total

AUC was significantly greater than 0.5 in models for females and for both genders

combined but not for the model for males. These results indicate that the logistic

regression model for female patients and for both genders combined appropriately fit

the data while the model for male patients does not accurately predict BPII and UP. The

following prediction model for female patients was derived:

Predicted Probability $= 1/\{1 + \exp(-5.8143 + 0.129601 \times (\text{NS score}) +$

$0.20554 \times (\text{ST score}))\}$

At the optimal cut-off point of 0.782 determined by the Youden index, the

sensitivity and the specificity of differentiating BPII from UP were 89% and 73%,

respectively.

4. Discussion

The main findings of the present study could be summarized as follows. Higher

HA, lower SD, and lower C scores were observed in both BPII and UP patients when

compared with controls. In females, ST scores significantly differed between BPII and

UP patients, with higher scores in BPII patients and lower scores in UP patients

compared to controls. Patients with UP showed lower NS scores compared to controls

in both genders and also to BP patients in females. BPII in depressed females could be

predicted using the NS and ST scores.

Consistent with our results, several previous studies have shown higher scores

on HA and lower scores on SD and C in patients with UP (Farmer et al., 2003;

Hansenne et al., 1999) or in those with BP (Engstrom et al., 2004; Evans et al., 2005)

compared to healthy controls. Higher NS (Evans et al., 2005; Nowakowska et al., 2005)

and ST (Evans et al., 2005; Loftus et al., 2008; Nowakowska et al., 2005) have also

been reported in BP patients compared to controls, though most studies comparing UP

patients and controls have shown no significant difference in these two dimensions

(Celikel et al., 2009; Evans et al., 2005; Farmer et al., 2003; Hansenne et al., 1999;

Kimura et al., 2000; Marijnissen et al., 2002; Nowakowska et al., 2005; Smith et al.,

2005). Although the comparison between BPII and UP patients showed similar trends in

both genders (i.e., higher NS and ST in BPII), statistical significance between these two

disorders was reached only in females. This suggests that, despite the similar tendency

in both genders, the differences between diagnostic groups in TCI profiles are more

evident in women than in men.

The mood state affects how the subjects describe their personality. Therefore, most previous studies on mood disorders assessed the personality in euthymic period. However, in order to be used as an aid for differentiating unipolar and bipolar depression in a real world clinical setting, it is required to evaluate TCI scores during depressed period. It has been reported that depressed individuals accurately portray their vulnerability to stress, their joylessness, and their lack of motivation, and that depression-caused changes in the assessed personality trait may reflect their current condition of the individual (Costa et al., 2005). Previous studies reported that severity of depression positively correlates with HA and negatively with SD scores (Farmer et al., 2003; Hansenne et al., 1999; Naito et al., 2000; Richter et al., 2000; Spittlehouse et al., 2010). In our study, however, correlation coefficients of HA and SD scores with HDRS scores did not reach statistical significance except for SD in male UP patients. This discrepancy might be due in part to the fact that we did not include patients with a HDRS score of 7 or less.

The fact that TCI scores are influenced by the severity of depression

complicates the interpretation of the findings. However, the prediction model of BPII

for female depressed patients in the present study is unlikely to be greatly biased by the

severity of depression for several reasons. First, the mean HDRS scores were similar in

BPII and UP patients. Secondly, HA and SD, which are previously reported to be

influenced by depression severity, were not included in the prediction model for females.

Thirdly, the correlation coefficients relating HDRS scores to each TCI score did not

significantly differ between female patients with BPII and UP.

The present study is the first to use personality profiles to create a logistic

regression model to predict BPII in depressed patients. Previously, Perlis, et al. (Perlis et

al., 2006) made a logistic regression prediction model accurately distinguishing BP and

UP by including age at onset, number of previous depressive episodes, family history,

Montgomery Åsberg Depression Rating Scale (MADRS) scores, and Hamilton Anxiety

Scale scores. Their model predicted bipolarity in depressed patients with a sensitivity of

69.0% and a specificity of 94.9%, with the total area under the ROC curve of 0.914.

Combining their model with the present one may result in a more accurate prediction

model with a wide clinical application.

A major strength of this study was that patients with BPII and UP were both in

depressed state with similar severity of depressive symptoms. To our knowledge, this

study is the first to compare the TCI score profiles in BPII and UP patients during

depressed states. Knowing the differences in TCI profiles in their depressed states could

help clinicians to predict bipolarity in depressed patients.

There are several limitations to this study. First, the crosssectional design did

not allow any definitive conclusions as to whether the TCI score profiles of the BPII

and UP patients were premorbid or the results of illness onset. Whether the TCI profiles

observed here can be generalized to recovered patients needs further investigation.

Some UP subjects in this study may go on to experience a manic/hypomanic episode

and be rediagnosed as BP, and thus follow-ups are necessary for accurate diagnosis.

Secondly, the subjects were recruited through methods such as advertisements and

notices, and therefore sampling biases may exist. Thirdly, bipolar patients in our study

were limited to BPII. Larger studies are needed to compare the TCI scores between

different subtypes of BP or UP. Fourthly, as the BPII and UP patients were limited to

those receiving outpatient treatments, our subjects might have been overrepresented by

milder forms of illness.

In conclusion, we assessed personality profiles in patients with BPII and UP during depressed period and confirmed that both UP and BPII patients have characteristic personality profiles in common: higher HA, lower SD, and lower C scores assessed with TCI when compared to controls. However, BPII and UP patients differ in some personality profiles, i.e., higher NS and ST in BPII than in UP patients particularly in female patients. Logistic regression analyses showed that BPII and UP could be predicted based on NS and ST scores in female patients. On the other hand, TCI scores were not very helpful for predicting BPII and UP in male patients. Our findings suggest that assessment of personality profiles using TCI in depressed female patients may serve as a useful tool to conveniently differentiate UP and BPII.

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Conflict of interest

The authors declare no conflicts of interest.

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