Risk Factors for Completed Suicide in Bipolar Disorder

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Background: Because Chinese bipolar patients in Taiwan, unlike Western patients, exhibit low comorbidity of substance abuse disorders, this retrospective and controlled study of completed suicide in bipolar patients explored the risk period and other risk factors for such an outcome.

Method: All acute inpatients with bipolar I disorder (DSM-IV) were followed from date of admission after January 1, 1985, until December 31, 1996, in regard to their death. The patients were followed by record linkage to the Death Certification System in Taiwan, which was issued throughout 1996. Nineteen female and 24 male patients died as a result of suicide within this period. Forty-one of 43 of the total number of patients were matched with 1 living bipolar individual (as a control subject) for age, sex, and date of admission. Demographic data, family history, and clinical characteristics were collected from the patients' medical records and were formally confirmed at every admission.

Results: The lifetime prevalence of alcohol/drug use disorders was 14.6% in suicide completers. Thirty suicide completers (69.8%) revealed duration of illness of at least 7 years at the time of death. The latency period from the presumed time of onset to completing suicide averaged 12.2 years. The mean age at the first suicide attempt was 31.1 years among 43 completers and 10 living controls who had ever attempted suicide. Conditional logistic regression revealed a strong association of suicide (p < .001) with the following factors: onset with mood-congruent psychotic feature (adjusted odds ratio [OR] = 0.18,95% confidence interval [CI] = 0.04to 0.74), positive first-degree family history of completed suicide (adjusted OR = 15.08, 95% CI = 1.39 to 163.50), and making a suicide attempt at least once in 7 years of illness (adjusted OR = 4.96, 95% CI = 1.03to 23.83). There appeared to be no significant difference in fasting levels of serum cholesterol or blood sugar between the suicide completers and the living controls.

Conclusion: The first 7 to 12 years subsequent to onset of affective illness and age less than 35 years may be the high-risk periods for suicide in bipolar disorder. Those bipolar disorder patients who have a first-degree family history of suicide and who have more suicide attempts (at least once in 7 years of illness) are likely to commit suicide. Symptomatology (e.g., mood congruence of psychotic features) at the time of presumed disease onset may potentially differentiate subgroups of bipolar patients with various levels of suicide risk.

(J Clin Psychiatry 2002:63:469–476)

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Supported by a research grant from the National Science Council of Taiwan (NSC 89-2314-B-038-009).

The authors thank Ms. Yu-Jiun Yau for data collection.

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T wenty-five percent to 60% of all bipolar patients will have attempted suicide at least once in their lifetime, and 18.9% of deaths among bipolar patients are due to suicide.¹ Although the earlier suicide estimates for bipolar patients could be too high,² the Epidemiologic Catchment Area (ECA) study revealed that bipolar patients, compared with all other DSM-III-defined patients, were the most likely to have a history of previous suicide attempt(s).³ However, in bipolar disorder, the generalizability of the clinical characteristics traditionally identified as potential risk factors for suicide remains questionable.^{1,4,5} Additionally, the association between suicide in bipolar disorder and biological correlates such as serum cholesterol levels and abnormal glucose metabolism⁶⁻⁸ remains unclear.

It has been suggested that those who commit suicide and those who survive suicide attempts represent different populations.⁹ Nevertheless, most of the existing suicide predictors for bipolar disorder emerged from studies of patients who had made suicide attempts. In the literature, studies of completed suicide among bipolar disorder patients share a similar limitation of a small sample size (i.e., less than 30 suicide completers).⁹⁻¹⁴ Gender differences and effects of age exist in the phenomenology, course of illness, comorbidity, and suicidality for patients with bipolar disorder.^{10,11,15} Thus, with many research studies of suicide in bipolar disorder, another major methodological shortcoming is the lack of a living age- and sex-controlled population with which to make valid comparisons.^{16,17}

The available reports concerning risk factors for suicide in bipolar disorder all involve studies of Western patients. Therefore, suicide outcome is complicated by more than 30% comorbidity of alcohol/drug use disorders in bipolar suicide victims,^{18,19} making it difficult to identify specific risk factors and demonstrate the nature of suicide in bipolar disorder. In Taiwan, various approaches have consistently reported less than 10% comorbidity of alcohol/drug use disorders in Chinese bipolar patients.^{20–22} We have previously demonstrated that, despite this difference in comorbidity of alcohol use disorders, the long-term psychosocial outcome²⁰ and the rate of suicide attempts²³ are both comparable to those corresponding to Western patients. Therefore, using Chinese patients from Taiwan, we may be able to identify risk factors of suicide in bipolar disorder that are less contaminated by substance abuse.

We designed the sex- and age-controlled study with a large sample of suicide completers with bipolar disorder to (1) explore the period of higher suicide risk during the illness and (2) assess which combinations of the clinical characteristics make an independent contribution to suicide.

METHOD

Source of Subjects

All the subjects involved in this study were collected from the Taipei City Psychiatric Center (TCPC), a psychiatric teaching hospital, with 300 beds for acute patients and 250 beds for chronic patients, that provides comprehensive psychiatric services and is assigned as a center for the northern Taiwan catchment region. Between January 1, 1985, and December 31, 1996, a total of 2133 patients with mood disorders were admitted to the TCPC. During this period, mood stabilizers (lithium, valproate, and carbamazepine) were available for patients with bipolar disorder, and typical antipsychotics, rarely atypical ones, were given while clinically indicated.

Clinical Information

Since 1980, a case notes form has been used for patients visiting the TCPC for the first time, and another form has been used for those being admitted to the TCPC. Both of these forms contain over 95 items structured to obtain specific and comprehensive information from patients regarding demographic data, past and present illness, mental state examination, physical condition, alcohol/drug use problem, and family history. Psychiatric diagnoses were based on DSM-III, DSM-III-R, or DSM-IV criteria, which were the criteria of the diagnostic system used in the hospital in the 1980s and the 1990s.

Psychiatric residents and attending physicians derived patient diagnoses through semistructured interviews at the time of hospital discharge, and the diagnoses were periodically reviewed by the attending physician in the outpatient department during the follow-up. Moreover, a semistructured parallel interview for confirming information was routinely conducted at patient admission, with family members or others who knew the patient well. The mental illness or suicide histories for first-degree relatives were routinely examined through interviews with probands or with other informants at every hospitalization period. Thus, the source of data pertaining to the patient's hospitalization included standard interviews, serial clinical assessments, and direct observation by residents, nursing staff, and social workers. The laboratory examination of blood and other metabolic measures of inpatients were routinely conducted the morning following an overnight period of fasting after admission to the TCPC.

Record Linkage

The national identity (ID) number is unique for each resident of Taiwan. Multiple identifiers were used (e.g., national IDs, name, age, sex, and date of birth) in the matching process to search for the deceased subjects. A record linkage in which the roster of inpatients with affective disorders was electronically matched against data files from the Department of Health Death Certification System in Taiwan issued from January 1, 1985, through December 31, 1996.

After the matching process was completed, 161 patients with mood disorders were identified as having died by the end of 1996. Missed linkages may have arisen due to recording errors as well as a result of name changes and other personal identifiers.

Information for each case, particularly in regard to psychiatric diagnoses, was carefully and independently reviewed by 2 members of our research group (T.S.Y. and K.C.J.). The determination/confirmation of the suicide death was based mainly on details recorded on death certificates, although an additional 4 suicides were found as a result of reviewing charts with familial confirmation available to clinicians during the study period. All deceased patients with mood disorders who had exhibited at least 1 manic or mixed episode prior to December 31, 1996, were identified. Strict DSM-IV diagnostic criteria were reapplied to each deceased patient to confirm diagnoses. Seven patients were not eligible for inclusion in the study as a result of either unclear chart documentation or premature discharge of index hospitalization. Together, a total of 125 deceased patients were diagnosed with bipolar I disorder, 43 (34.7%, 19 female and 24 male) of whom having committed suicide.

The second phase of the study consisted of selecting control subjects and collecting the clinical data of the study and the control groups. Each suicide was matched with 1 living patient with bipolar disorder (as a control subject) on the basis of age (± 2 years), sex, and date of the index admission (± 3 years). As living controls for 2 of the 43 suicide completers were not available, the final study population consisted of 41 suicide completers and 41 living patients with bipolar disorder who gave their written informed consent. The chart reviewers were blind to the subjects' case or control status. Subsequently, the initial study findings were reviewed by a consensus panel of authors with many years of experience in mood disorder research to verify the apparent accuracy and completeness of data for each of the subjects entered into our database.

Clinical Data Collection

For the purpose of data reliability, we used only the data provided in the medical and nursing notes. If the patient had undergone several hospitalizations during the study period, the most recent event was considered to be the index hospitalization. The onset of bipolar disorder was defined as the first occurrence of affective symptoms causing severe impairment in the psychosocial functioning of the subject or symptoms necessitating hospitalization. For reviewing the charts, we developed a specialized chart abstraction form consisting of 87 items that required, typically, about an hour to complete. Substantive areas of the form included demographic characteristics, social support network, and laboratory data relating to the index hospitalization and other clinical features of the full history, all of which were computerized for analyses. The full history regarding the symptoms of illness onset, number of affective episodes, history of suicide attempt, coexisting significant physical illness, and alcohol/drug use problems were obtained from the case notes (including outpatient and previous inpatient visits) and started with their first visit to TCPC-for most, their first hospitalization. Furthermore, all the extracted data were double checked to rule out potential individual errors.

According to the case notes of the first psychiatric visit with hospitalization, a subject was categorized as exhibiting mood-congruent psychotic features at onset of affective illness on the basis of the standard definitions in the DSM-IV criteria. (The contents of hallucinations and delusions were entirely consistent with the typical affective theme of such a condition.) Severe or significant medical illness was extracted from case notes if it could be potentially life threatening without regular follow-up.

Serious or potentially life-threatening acts of self-harm requiring hospital treatment were considered suicide attempts by consensus ratings of chart material among the authors. Suicide attempts made prior to the index hospitalization were rated using an assessment of suicidality included in the hospital-intake materials completed for all patients. Data were corroborated by additional narrative material as reported in the progress notes and psychiatric discharge summaries compiled by physicians, nursing staff, and social workers. The total number of prior suicide attempts and the methods used at the time were also recorded. Information about the suicide methods selected by the completers was obtained mainly from certificates of death as well as from medical records and, if available, from reports given by family members of the deceased. For further analysis, the assessment of prior suicidal history included a continuous rate measure of suicidal intensity (attempts per years at risk).

Statistical Analysis

Two-group comparisons, between suicide completers and controls, were made by using the chi-square test with Yates' correction or the Fisher exact test when explanatory variables were categorical and the 2-tailed Student t test was used for continuous variables.

The analysis reported herein involves a conditional logistic regression equation fitted through a stepwise variable selection procedure with the use of SPSS Base 9.0 software. The potential independent variables with at least a moderate association with suicide (p < .15) were selected for entry into multivariate logistic regression models.

RESULTS

During the study period, the mean \pm SD duration of the index hospitalization for the study and control subjects was 50.7 ± 17.1 days. Among the 43 suicide completers, the mean age at time of completing suicide for women (N = 19) was 33.0 ± 8.3 years and did not significantly differ from that for men (N = 24) at 36.5 ± 13.1 years. Twenty-five suicide completers (58.1%) were 35 years of age or younger at the time of death. The suicide completers used methods including drowning (N = 11), drugs/ poison (N = 10), jumping (N = 10), hanging (N = 5), inhaling gas (N = 4), and others (N = 3), but none used firearms. Thirty suicides (69.8%) occurred within the first 6 months following the subjects' last psychiatric contact in the TCPC, including 24 suicides within the first month. The mean \pm SD interval from the index admission to death was 27.8 ± 29.2 months (range, 0–123 months). Seventeen suicides (39.5%) occurred within the first 12 months subsequent to the last admission, including 4 suicides (9.4%) during the index hospitalization period and 6 suicides (14.0%) within 12 to 24 months.

There were significantly more suicide completers (N = 22, 51.2%) having made previous suicide attempt(s) prior to their index hospitalization compared with controls (N = 10, 24.4%) ($\chi^2 = 4.32, p < .05$). Among patients with previous suicide attempt(s) at time of index hospitalization, the mean \pm SD age at the first suicide attempt as 30.3 ± 8.8 years (range, 19–52 years) for suicide completers (N = 22) and was comparable to 28.0 ± 7.8 years (range, 16–42) years) for controls (N = 10). On the other hand, 21 (48.8%) of the suicide completers died as a result of their first suicidal acts. Thus, for suicide completers, themean \pm SD age of the first suicide attempt was 31.8 ± 11.1 years (range, 17-65 years), with 25 (58.2%) of these completers having the duration of illness greater than 5 years prior to the first suicidal act. Taken together, for those 53 individuals from the study and control groups making any suicide attempt, the mean \pm SD age at the first suicide attempt was 31.1 ± 10.4 years with a mean \pm SD of 9.7 ± 9.9 years from onset of illness. One patient attempted suicide at the onset

Table 1. Sociodemographic Characteristics of Suicide	
Completers and Living Controls With Bipolar Disorder	at the
Index Hospitalization ^a	

	Suicide Completers (N = 41)		Living Controls (N = 41)		
Characteristic	Ν	%	Ν	%	
Early (≤ 15 years old) parental loss	7	17.1	11	26.8	
Marital status					
Never married	19	46.5	21	51.2	
Separated or divorced	6	14.6	4	9.8	
Married/widowed	16	39.0	16	39.0	
Living with family members	37	90.2	36	87.8	
Socioeconomic class					
Class I	0	0	2	4.9	
Class II	1	2.4	2	4.9	
Class III	1	2.4	3	7.3	
Class IV	> 8	19.5	6	14.6	
Class V	31	75.6	28	68.3	
Education ≥ 12 years	18	43.9	22	53.7	
Unemployed	26	63.4	20	48.8	
^a The mean cumulative age at the	end o	f 1999: sui	cide comp	leters,	

 43.6 ± 11.4 years; living controls, 43.5 ± 10.9 years.

of bipolar disorder. Moreover, 30 completers (69.7%) had at least 7 years of bipolar illness at the time of their completed suicides. The mean \pm SD interval from onset of bipolar disorder to completing suicide was 12.2 ± 10.2 years.

All of the sociodemographic data pertaining to the index hospitalization are listed in Table 1. The sociodemographic characteristics of suicide completers were comparable to those of controls. Overall, most of the suicide completers and controls were predominantly rated in the lower socioeconomic classes (Hollingshead's class IV or V)²⁴ and lived with family members.

Categorical variables of the full history of suicide completers and controls are summarized in Table 2. A higher proportion of the suicide completers revealed a positive first-degree family history of suicide (p < .03)than that of living controls. In total, 52 (63.4%) of 82 bipolar individuals in the study had any psychotic feature at illness onset. Suicide completers and living controls did not significantly differ in the presence of psychotic features at illness onset. However, further comparisons showed that suicide completers were less likely to display mood-congruent psychotic features at illness onset (N = 16, 39.0%) than living controls (N = 25, 61.0%) did $(\chi^2 = 3.95, df = 1, p < .05)$. There was no difference between suicide completers and living controls in the proportion of those who had mood-incongruent psychotic features at illness onset (suicide completers, N = 8, 19.5%; living controls, N = 3, 7.3%; Fisher exact test, NS). Otherwise, there was no significant difference between suicide completers and living controls in any of the clinical variables assessed.

Comparisons of continuous variables for the whole study population are shown in Table 3. The controls had a

Table 2. Clinical Characteristics in the Full History of Bipolar
Disorder in Suicide Completers and Living Controls:
Comparisons of Categorical Variables

	Su Com (N	icide pleters = 41)	Living Controls (N = 41)	
Characteristic	Ν	%	Ν	%
Mania as the first episode	25	61.0	19	46.3
Onset with psychotic features ^a				
Absence	17	41.4	13	31.7
Mood-congruent	16	39.0	25	61.0
Mood-incongruent	8	19.5	3	7.3
History of rapid cycling	7	17.1	8	19.5
History of depressive episode	29	70.7	27	65.9
Family history in a				
first-degree relative				
Suicide ^b	7	17.1	1	2.4
Mood disorders	13	31.7	6	14.6
Bipolar disorder	8	19.5	4	9.8
Coexisting significant physical	10	24.4	16	39.0
illness in lifetime				
Cigarette smoking in lifetime	18	43.9	17	41.5
Comorbid other substance use disorders in lifetime	1	2.4	3	7.3
Comorbid alcohol use disorders in lifetime	5	12.2	3	7.3
${}^{a}\chi^{2} = 4.82$, df = 2, p = .09. ^b Fisher exact test, p < .03.				

shorter mean interval between onset of illness and first psychiatric contact and a significantly longer mean period of follow-up at the TCPC than suicide completers did. Therefore, to examine the suicidal intensity and morbidity of both suicide completers and controls based on chart review, the time intervals of illness were defined as years from onset of bipolar disorder to last TCPC contact, the measure of suicidal intensity (annual rate of suicide attempts) as the number of suicide attempts per year of illness, and the morbidity measure as the number of admissions and affective episodes per year of illness. For all subjects, the suicide completers demonstrated a significantly greater (p < .003) suicidal intensity (annual rate of suicide attempts prior to their deaths) than was the case for controls. There was no significant difference noted for other clinical variables shown in Table 3 between suicide completers and controls, including levels of fasting blood sugar and serum cholesterol on the index hospitalization.

We conducted a conditional logistic regression analysis to assess the simultaneous impact of several potential risk factors of suicide, based upon preliminary univariate associations identified in the preceding analyses (Tables 2 and 3). Further statistical analysis was carried out to yield an explanatory model for predicting suicide outcome that was highly significant overall. When the cutoff for suicidal intensity was 1/7 or greater (i.e., prior to completing suicide at least 1 suicide attempt within 7 years of illness), the 3 factors revealed a strong association of suicide ($\chi^2 = 17.36$, df = 3, p < .001), in rank order of their overall significance: onset with mood-congruent psychotic

Table 3. Clinical Characteristics of Bipolar Disorder in Suicide Co	mpleters and
Living Controls: Comparisons of Continuous Variables ^a	

	Suic Comp (N =	tide leters 41)	Livi Cont (N =	ing trols 41)	t	р
Variable	Mean	SD	Mean	SD	(2-tailed)	Value
Variables of the full history						
Age at first TCPC psychiatric contact, y	28.0	8.6	27.3	9.3	0.677	NS
Age at onset, y	22.3	6.2	23.3	8.0	-0.644	NS
Age at last TCPC visit, y	33.5	9.2	37.9	9.6	-2.108	< .04
Suicide attempts	0.11	0.22	0.03	0.07	2.248	< .003
Total episodes	1.00	0.70	0.81	0.55	1.347	NS
Variables of the index hospitalization						
Age at index hospitalization, y	31.9	9.4	34.8	9.6	-1.350	NS
Hospital admissions	0.55	0.50	0.47	0.37	0.823	NS
Body weight, kg	60.0	10.5	61.0	12.9	-0.369	NS
Body length, cm	161.8	7.2	161.9	7.7	-0.056	NS
Fasting blood sugar, mg/dL	108.8	54.1	97.9	14.7	1.230	NS
Serum cholesterol, mg/dL	160.8	34.7	170.7	39.4	-1.189	NS
^a Abbreviations: NS = not significant, TCPC =	= Taipei C	City Psyc	chiatric Ce	enter.		
Shr)					

Completed Suicide in Bipolar Disorder ^a					
Variable	Adjusted OR	95% CI for OR	p Value		
Onset with mood-congruent psychotic features	0.18	0.04 to 0.74	< .025		
Positive first-degree family history of completed suicide	15.08	1.39 to 163.5	< .05		
Suicide attempts/y	4.96	1.03 to 23.83	<.05		

feature, a positive first-degree family history of completed suicide, and suicidal intensity (> 1 suicide attempt within 7 years). The results of this regression analysis are presented in Table 4.

DISCUSSION

To the best of our knowledge, this is the first study of a non-Western bipolar sample incorporating sex- and age-matched living controls to examine variables associated with completed suicide. The proportion of patients (68.3%), who had previous depressive episode(s), in the entire study population is somewhat less than the 80% to 90% for Western patients.^{1,25} It is the depressed phase of bipolar disorder¹ or the severity of concurrent depressive symptoms in manic episode^{18,26} that is associated with suicidality in bipolar patients. Thus, in our study, only 70.7% of the suicide completers having had a prior depressive episode could be explained by the fact that the rest of the completers might complete suicide in their first depressed or mixed episode after a manic attack. The suicide completers and living controls in our study have similar sociodemographic characteristics at the index hospitalization. The controls manifest several typically clinical characteristics of bipolar disorder as described in the literature, in-

cluding age at onset, fewer than 50% of controls experiencing an onset with a manic episode, and fewer than 20% exhibiting a history of rapid cycling.²⁷ Moreover, that most (83.7%) of the suicide completers visited the TCPC within the 12 months prior to completing suicide and had a mean 50-day stay of index hospitalization may help to minimize methodological limitation in terms of data validity. Our family history method probably detects illness among relatives with less sensitivity. However, the positive rates of bipolar disorder and mood disorder in first-degree relatives of our living controls lie within the range 4% to 24% estimated by the literature.^{27,28} Overall, therefore,

the methodological validity of this study appears satisfactory, and it appears that our data would be reliable.

Both living alone and substance abuse are traditionally considered risk factors for suicide. Affective episodes of bipolar disorder, in particular manic episodes, are reported to have a negative impact on the family life and social networks of involved patients.²⁹ Comorbid alcohol/ drug use disorder worsens such relationship problems in bipolar disorder. Thus, the higher proportion of suicide completers with bipolar disorder who were divorced and lived alone is likely to have been a consequence of the devastating effect of the illness process on social relationships.³⁰ The Western reports of bipolar disorder show that 25% to 40% of suicide victims lived alone.^{10,12,30} As also indicated in our earlier parasuicide study,²³ this present study demonstrates that the vast majority (greater than 85%) of the Taiwanese bipolar patients lived with their family at the time of suicide. For this study, as compared with Western studies, both a lower comorbidity of alcohol/drug use disorders and the rather rare occasion to live alone collectively reduced their confounding effects on the suicide outcome of bipolar disorder and strengthened the import of our findings.

Acknowledging the above-mentioned ethnic differences, the present study describes several culturally and ethnically independent characteristics of suicide for bipolar patients. First, our data indicated that approximately 70% of completed suicides occurred after 7 years from illness onset. This finding supports 2 Western reports that most severe suicide attempts did not occur in the early phase of bipolar illness.^{10,12}

For our entire study population, the first suicide attempt occurred at a mean age of 31 years for those individuals making any suicide attempt, and approximately 60% of completed suicides occurred before the patient reached 35 years. These results indicate that young bipolar patients constitute a high-risk group for suicide.9,26 In our 15-year follow-up of 101 bipolar patients, the mean age at the first suicide attempt was 29.5 years with a mean 9.5-year interval from illness onset for 53 bipolar individuals having a history of attempting suicide.²³ Thus, at the first occurrence of suicide attempt, both the mean age and the mean length of illness for various subgroups of Taiwanese bipolar patients were strikingly similar. Additionally, the mean age at first parasuicide of our patients was comparable to 33.4 years in a German bipolar group receiving lithium prophylaxis.³¹ The latency period from bipolar illness onset to the first suicide attempt for Western-based investigations ranged from 5 to 12 years.^{31,32} Therefore, our present finding was consistent with Sharma and Markar's¹² observation that suicide in bipolar disorder was uncommon when follow-up extended over a period of greater than 10 years.

More than half of the completed suicides in this study occurred within the first 2 years following the index admission. This finding concurs with the fact that the first 2 post-hospitalization years are a period of great risk for suicide among psychiatric patients.^{10,14,33} The suicide risk does not decline with patients' age, but remains constant with each successive episode.³⁴ Taken together, we estimate here that the period from 7 to 12 years following the onset of illness, the time that a patient is under 35 years of age, and the first 2 years subsequent to the index admission are the periods in which bipolar individuals are at an increased risk of suicide.

There are 3 major findings in the present study. First, a family history of suicide among first-degree relatives is an important risk factor for suicide in bipolar disorder. This finding is consistent with previous surveys for both Chinese and Western populations with a wide variety of psychiatric disorders.^{35,36} Not being a strongly significant correlate, a family history that is positive for mood disorders does indicate some association with suicide in this sample. Although detailed family history data were not uniformly available for each of our study subjects to make a reliable diagnosis for the family of each of them, the present data do suggest that a familial loading for suicide or mood disorders may constitute a lethally prognostic significance for bipolar disorder.

Second, 51.2% of suicide completers had previous suicide attempt(s), and the rate is similar to 55% in a Finnish bipolar study¹⁰; in other words, about half of the suicide completers died in the first attempt. Furthermore, the suicide completers were significantly more likely to have made at least 1 suicide attempt within the 7 years prior to their deaths than were the controls. It was reported that suicide attempts in the early course of recurrent affective disorders might provide a "cathartic effect," which leads to a lower risk of suicide in the later course of the illness.³⁷ In contrast, our results support the notion that not only a history of prior suicide attempts but also the number of prior attempts is critical for predicting suicide in bipolar disorder patients. Thus, preventing any suicide act subsequent to the onset of bipolar disorder may have important implications in regard to activity intended to reduce the mortality of suicide in the future.

Third, manifestation of mood-congruent psychotic features at the onset of bipolar disorder may be 1 significant factor in reducing the risk of suicide. The present finding agrees with the prognostic validity of differentiating the mood congruence of psychotic features during bipolar mania, i.e., mood-incongruent psychotic features predict poor outcome.³⁸ Additionally, it has previously been suggested that a person who is psychotic during 1 episode of affective illness is highly likely to be psychotic during subsequent episodes.^{13,39} In our study, 63.4% of all bipolar individuals had any psychotic feature at illness onset. Another strength of this study is that such a rate is very close to the estimate of Goodwin and Jamison,¹ approximately two thirds of manic-depressive patients having a lifetime history of at least 1 psychotic symptom. Some of the clinical characteristics of bipolar disorder may be modified through psychopharmacologic treatment and may change with time under certain conditions (e.g., changes in polarity and symptomatic severity). Thus, we focused on the clinical features at onset, as stable variables for predicting suicide, rather than their becoming apparent during the illness of bipolar disorder.

The present data cannot describe the psychopathology of this condition as completely and effectively as a prospective study could. Yet, even so, we still suggest that the symptomatology noted at onset, particularly the mood congruence of psychotic features, may potentially classify the patients into separate subgroups with various levels of suicide risk. Although to what extent such a finding can be generalized to various statuses of bipolar illness needs further inquiry, a prospective follow-up study incorporating a comprehensive and detailed assessment of the presenting symptoms for new-onset mania is clearly warranted. Though medication taken by individuals in the study could not be controlled, it is a widely accepted conclusion that mood-stabilizer treatment and adequate prophylaxis can prevent suicide in the long-term sense.³¹ We also have found that compliance with pharmacotherapy is important in achieving favorable overall longterm outcome of bipolar disorder.⁴⁰ Thus, another way to prevent suicide in bipolar disorder is to vigorously treat the illness.

In terms of biological risk factors, our findings disagree with the hypothesis of a relationship between serum cholesterol along with fasting glucose levels and violent suicide for the general population and psychiatric patients.⁶⁻⁸ The mean serum cholesterol concentration value for both the controls and the suicide completers in our study are comparable to the mean value (158 mg/dL) for the Chinese population aged 35 to 64 years⁴¹; all such values are lower than those (> 184 mg/dL) reported for the Western population and for patients with other diagnoses as well.⁶⁻⁸ Thus, it follows that such biological risk factors for suicide in bipolar disorder may vary among different ethnic groups, and this possibility remains open for further investigation.

This study still suffers from several limitations. Since the DSM-IV criteria allow more psychotic features than DSM-III, the fact that our patients were diagnosed using different criteria may affect the homogeneousness of the study population. However, patients' final diagnoses were always based on the most recent event. Patients who had their last psychiatric contact after 1994 should have all been diagnosed by the same criteria, DSM-IV. Other causes of death (usually "accidental") are often put on the death certificate for official use to avoid any potential stigma associated with the suicidal acts for both the deceased themselves and their relatives. Therefore, the incidence of suicide is highly likely to be underestimated in the present study. Additionally, matching for age and gender can lead to loss of the ability to detect such explanatory variables. We acknowledge that these unavoidable limitations should discount the clinical value of the aforementioned findings.

In conclusion, the interval from 7 to 12 years following the onset of illness, an age of less than 35 years, and the first 2 years after last admission may be the periods of highest risk for suicide in patients with bipolar disorder. Those bipolar disorder patients who have a first-degree family history of suicide and who have more previous suicide attempts (i.e., suicide attempt at least once in 7 years of illness) are more likely to complete suicide in the future. Since onset with mood-congruent psychotic features might reduce the risk of suicide, there exists a need for further investigation that focuses on the clinical features of bipolar disorder at onset with respect to the relevance of such clinical features to the potential suicide outcome.

Drug name: carbamazepine (Tegretol and others).

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