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The relationship of aggression to suicidal behavior in depressed patients with a history of alcoholism

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Abstract

Background: Alcoholism and depression are often comorbid. Studies suggest that depressed subjects with alcoholism have more chronic impairment and suicidal behavior than individuals with either diagnosis alone. The reason for higher rate of suicide and suicide attempts in comorbid subjects is uncertain. We explored clinical characteristics that may be associated with this increased suicidality.

Methods: In all, 219 depressed subjects ($n=62$ males and $n=157$ females) without a history of any alcohol or substance use disorder and 129 ($n=49$ males and $n=80$ females) depressed individuals with a prior history of alcohol use disorder participated in the study. Demographic and clinical parameters were assessed and recorded.

Results: Depressed subjects with a history of alcoholism had higher lifetime aggression and impulsivity, and were more likely to report a history of childhood abuse, suicide attempts, and tobacco smoking. Depressed suicide ideators with a history of alcoholism had higher suicide ideation scores than depressed suicide ideators without a history of alcoholism. Subjects with a history of alcoholism were younger at the time of the first depressive episode and first hospitalization than those without a history of alcoholism. Logistic regression analysis indicated that alcoholism was significantly associated with smoking and aggression. Suicidal behavior and higher suicidal ideation in depressed subjects with a history of alcoholism might be attributed to higher aggression scores in this group.

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Conclusion: The greater frequency of suicidal behavior and severity of suicidal ideation in major depression with comorbid alcoholism appears related to associated aggressive traits. Alcoholism, aggression, smoking, and suicide may have a common biological causal substrate.

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Keywords: Alcoholism; Depression; Aggression; Suicide

1. Introduction

Alcohol dependence and affective disorders are often comorbid (Cornelius, Salloum, Day, Thase, & Mann, 1996; Davidson & Blackburn, 1998; Gilman & Abraham, 2001; Herz, Volicer, D'Angelo, & Gadish, 1990; O'Sullivan et al., 1988; Schuckit, 1986; Spak, Spak, & Allebeck, 2000; Thase, Salloum, & Cornelius, 2001). Schuckit (1986) suggests that between one-quarter and two-thirds of subjects with alcoholism have had depressive symptoms severe enough to interfere with functioning.

Suicide is commonly associated with depression and alcoholism (Mann, 2003; Oquendo, Malone, & Mann, 1997; Roy & Linnoila, 1986; Sher, Oquendo, & Mann, 2001). The lifetime mortality due to suicide in major depression is estimated to range from 2% to 15% depending on severity and inpatient status (Bostwick & Pankratz, 2000; Sher et al., 2001). Lifetime mortality due to suicide in alcoholism was been reported to be as high as 18% (Roy & Linnoila, 1986) although others give lower estimates (2–15%) (Murphy & Wetzel, 1990).

Studies suggest that depressed subjects with alcoholism have more chronic impairment and suicidal behavior than individuals with either diagnosis alone (O'Sullivan et al., 1988; Cornelius et al., 1996; Thase et al., 2001). The reason for the higher rate of suicide and suicide attempts in comorbid subjects is uncertain. A number of studies suggest that aggression and smoking are associated with suicidal behavior as well as with substance abuse (Angst & Clayton, 1998; Doll & Peto, 1976; Hemenway, Solnick, & Colditz, 1993; Koller, Preuss, Bottlender, Wenzel, & Soyka, 2002; Malone et al., 2003; Mann, Waternaux, Haas, & Malone, 1999; Miller, Hemenway, Bell, Yore, & Amoroso, 2000; Oquendo et al., 2000; Paffenbarger, Lee, & Liung, 1994; Placidi et al., 2001; Sher et al., 2001; Tanskanen, Viinamäki, Hintikka, Koivumaa-Honkanen, & Lehtonen, 1998; Tverdal, Thelle, Stensvold, Leren, & Bjartveir, 1993). We hypothesized that (1) subjects with alcoholism and depression will have greater aggression scores and more likely to be smokers; and (2) higher suicidality in depressed subjects with alcoholism is related to higher aggression and higher prevalence of smoking in this group.

2. Methods

2.1. Subjects

Participants were recruited through advertising and referrals and participated in mood disorders research in a university hospital. All subjects gave written informed consent as

required by the Institutional Review Board for Biomedical Research. In all, 219 depressed subjects ($n=62$ males and $n=157$ females) without a history of any alcohol or substance abuse/dependence and 129 ($n=49$ males and $n=80$ females) depressed individuals with a history of alcohol abuse/dependence participated in the study. All met DSM-IV (American Psychiatric Association, 1994) criteria for a current major depressive episode. All subjects were free from alcohol or substance abuse for at least 2 months, therefore the current episode of major depression was independent, i.e., not alcohol- or substance-induced. The duration of the drug-free status of the subjects was established by a combination of urine and blood toxicological screenings, observation in hospital, and a history obtained from the participant, the participant's family and the referring physician.

2.2. Measures

DSM-IV Axis I and Axis II disorders were diagnosed using the Structured Clinical Interview I (SCID-I) and the Structured Clinical Interview II (SCID-II), respectively, for DSM-IV (American Psychiatric Association, 1994). All subjects had a physical examination and routine laboratory screening tests, including urine and blood toxicological screenings to rule out neurological or medical illness that could affect their mental status. Current severity of depression was assessed by the Hamilton Depression Rating Scale (HDRS) (Hamilton, 1960) and the Beck Depression Inventory (BDI) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). Lifetime aggression and impulsivity were assessed with the Aggression History Scale (Brown-Goodwin, revised) (Brown & Goodwin, 1986) and the Barratt Impulsivity Scale (Barratt, 1965), respectively. Current hopelessness was measured with the Beck Hopelessness Scale (Beck, Weissman, Lester, & Trexler, 1974). A lifetime history of all suicide attempts, including number of attempts and the method and degree of medical damage for each attempt, was recorded on the Columbia Suicide History Form (Oquendo, Halberstam, & Mann, 2003). A lethality scale was used to measure the degree of medical damage caused by each suicide attempt (Beck, Beck, & Kovacs, 1975). The scale was scored from 0 to 8 (0=no medical damage, 8=death), with different anchor points for various suicide attempt methods. A suicide attempt was defined as a self-destructive act that was committed with some intent to end one's life. The degree of suicide intent was rated with the Suicide Intent Scale (Beck, Morris, & Beck, 1974). The Scale for Suicide Ideation (Beck, Kovacs, & Weissman, 1979) was used to measure the severity of suicidal ideation during the week prior to index hospitalization. Life events were scored on the St. Paul Ramsey Life Events Scale (Oquendo et al., 2003).

2.3. Statistical analysis

Clinical and demographic data were compared using Student's *t*-test, Wilcoxon test, and chi-square test, as appropriate. A logistic regression analysis was used to examine the association between alcoholism (dependent variable) and smoking and aggression (independent variables).

The association between suicide attempt status (dependent variable) and alcoholism, smoking, and aggression (independent variables) was evaluated using a logistic regression

analysis. Then, based on the Scale for Suicide Ideation all patients were divided into two groups: patients who do not report any suicidal ideation at all (“non-ideators”), and people who do (“ideators”). This is consistent with the way the Scale for Suicide Ideation is used: raters stop if there are no “Yes” answers to the first 5 questions. Thus, this Scale distinguishes ideators from non-ideators. A chi-square test was used to compare the proportion of ideators and non-ideators in subjects with or without a history of alcoholism. Suicide ideation scores in ideators with or without a history of alcoholism were compared using Wilcoxon test. Then, an analysis of covariance was used: the suicidal scores for ideators were the dependent variable, and alcoholism, aggression, and smoking were independent variables.

3. Results

3.1. Demographic data

Demographic and clinical characteristics of depressed subjects with or without a history of alcoholism are presented in Tables 1–3. Subjects with a history of alcoholism were younger, less likely to be married, and had fewer years of education compared with subjects without a history of alcoholism.

3.2. Clinical characteristics

Subjects with a history of alcoholism were younger at the time of the first depressive episode and at the time of the first hospitalization than subjects without alcoholism (Table 3). However, depressed subjects with and without a history of alcoholism did not differ in current severity of depression. As hypothesized, depressed subjects with a history of alcoholism had higher aggression and impulsivity scores than depressed subjects without a history of alcoholism (Tables 2 and 3). Subjects with a history of alcoholism also had higher prevalence of reported childhood abuse, and were more likely to be tobacco smokers than depressed subjects without a history of alcoholism (Tables 2 and 3). Logistic regression analysis showed that alcoholism was related to both aggression ($df=1$, Wald’s $\chi^2=41.8$, $p<0.001$) and smoking

Table 1
Demographic characteristics of depressed subjects with and without a history of alcoholism

Variable name	Subjects without a history of alcoholism ($n=219$)		Subjects with a history of alcoholism ($n=129$)		Analysis		
	Mean or N	SD or (%)	Mean or N	SD or (%)	df	t/χ^2	P
Age (years)	42.0	14.6	37.7	11.1	347	−2.9	0.004
Gender (%males)	62	(28.3)	49	(38.0)	1	3.6	0.06
Race (%white)	160	(73.2)	91	(70.5)	1	0.3	0.6
Marital Status (%married)	81	(36.8)	33	(25.6)	1	4.7	0.03
Total years of education	14.8	3.5	14.0	2.7	336	−2.1	0.04

Table 2

Measures of the current state of depressed subjects with and without a history of alcoholism

Variable name	Subjects without a history of alcoholism (n=219)		Subjects with a history of alcoholism (n=129)		Analysis		
	Mean or N	SD or (%)	Mean or N	SD or (%)	df	t/ χ^2 /z	P
Hamilton Depression Rating Scale (HDRS)	18.0	7.9	17.5	7.0	342	-0.6	0.6
Beck Depression Inventory (BDI)	26.2	12.7	28.4	12.3	309	1.5	0.1
Beck Hopelessness Scale	11.5	6.02	12.2	6.0		1.1 ^a	0.3 ^a
Suicidal Ideation Scale-in suicide ideators (n=188)	14.1	9.2	18.7	8.8		3.4 ^a	0.0007 ^a
St. Paul Ramsey Scale (life events)	3.8	1.7	4.1	1.1	212	1.8	0.08
Reasons for Living Inventory	159.0	48.5	151.4	44.4	184	-1.1	0.3
% Inpatients	126	(57.7)	66	(51.2)	1	1.4	0.2
% Bipolar	25	(11.4)	17	(14.7)	1	0.8	0.4

^a Wilcoxon two-sample test.

($df=1$, Wald's $\chi^2=26.8$, $p<0.001$). Depressed subjects who smoke were more likely to have a history of alcoholism (odds ratio=4.37, 95% confidence interval=2.50–7.64). Each point of increase on the Brown-Goodwin aggression history scale increased the odds of alcoholism by 20% (odds ratio=1.2, 95% confidence interval=1.14–1.27).

3.3. Suicidality

Depressed subjects with a history of alcoholism were more likely to have attempted suicide (Table 3). However, there was no group difference in suicide intent scale scores, maximum lethality of suicide attempts, or the number of attempts in attempters. Logistic regression analysis indicated that depressed subjects with a history of alcoholism were 2.1 times more likely to be suicide attempters than the nonalcoholic group (95% confidence interval=1.35–3.3).

The logistic regression model showed that the higher prevalence of suicide attempters in the group with a history of alcoholism compared to the group without a history of alcoholism was related to higher aggression scores in the group with alcoholism ($df=1$, Wald's $\chi^2=13.2$, $p=0.0003$). For each incremental point on the aggression scale, the odds of being a suicide attempter increased by 10% (odds ratio=1.1, 95% confidence interval=1.04–1.15).

There was no difference in the proportion of suicide ideators in depressed subjects without a history of alcoholism (73%) and depressed subjects with a history of alcoholism (77%) ($df=1$, $\chi^2=0.5$, $p=0.5$). However, suicide ideators with a history of alcoholism had significantly higher suicide ideation scores (18.7 ± 8.8) than ideators in the other group (14.1 ± 9.2) (Wilcoxon $z=3.4$, $p=0.0007$). Adjustment for smoking and aggression demon-

Table 3

Potential traits and scores on measures of potential traits related to suicidal diathesis of depressed patients with and without a history of alcoholism

Variable name	Subjects without a history of alcoholism (<i>n</i> =219)		Subjects with a history of alcoholism (<i>n</i> =129)		Analysis		
	Mean or <i>N</i>	SD or (%)	Mean or <i>N</i>	SD or (%)	<i>df</i>	<i>t</i> / χ^2 / <i>z</i>	<i>P</i>
<i>Measures related to a psychiatric history</i>							
Cigarette Smoking (%smokers)	45	(20.4)	76	(59.2)	1	53.1	<0.0001
Number of previous depressive episodes	3.4	2.7	3.2	2.5		−0.4 ^a	0.7 ^a
Number of previous hospitalizations	2.5	5.55	3.2	7.9		1.4 ^a	0.2 ^a
Age of onset of the first depressive episode	28.2	14.7	24.0	11.5		−2.4 ^a	0.02 ^a
Age at first hospitalization	35.2	14.3	30.9	11.9		−2.5 ^a	0.01 ^a
Prevalence of a history of childhood abuse	86	(39.3)	62	(51.8)	1	4.5	0.03
<i>Measures related to suicidal behavior</i>							
Suicide Attempt Status (%attempters)	97	(44.4)	75	(62.8)	1	10.9	0.001
Suicide Intent Scale (SIS) in attempters	17.0	5.30	15.7	5.7		−1.6 ^a	0.1 ^a
Maximum lethality of suicide attempts	3.4	2.0	3.3	1.8	171	−0.3	0.8
First-degree relatives who had attempted/completed suicide (%)	21	(9.4)	17	(14.5)	1	2.1	0.2
Number of suicide attempts in attempters	2.7	2.4	2.3	1.6		−0.5 ^a	0.6 ^a
<i>Scores on measures of aggression and impulsivity</i>							
Aggression History Scale	16.1	4.5	21.6	6.1	312	9.3	<0.0001
Barrat Impulsivity Scale (BIS)	50.4	16.2	59.2	18.8	295	4.3	<0.0001

^a Wilcoxon two-sample test.

strated that the difference between the two groups of ideators is related to aggression ($df=1,173$, $F=8.6$, $p=0.004$).

4. Discussion

4.1. Alcoholism and suicidality

We found that depressed subjects with a history of alcoholism were more likely to be suicide attempters than depressed subjects without a history of alcoholism, and that suicide ideators

with a history of alcoholism had higher suicidal ideation scores than suicide ideators without a history of alcoholism. Our findings are consistent with the literature reporting higher suicidal ideation and higher risk for attempted suicides in individuals with alcoholism compared to persons without a history of alcoholism (Cornelius et al., 1996; Lester, 2000; Mann, 2003; Murphy & Wetzel, 1990; O'Sullivan et al., 1988; Rossow, Romelsjo, & Leifman, 1999; Sher et al., 2003). High rates of suicide attempts among individuals with alcohol use disorders have been reported (Kessler, Borges, & Walter, 1999; Rossow et al., 1999). In an urban community in the US, 24% of subjects with alcoholism attempted suicide, as compared to 5% with other psychiatric diagnoses (Weissman, Myers, & Harding, 1980). Forty percent of a sample of depressed subjects with alcoholism who were hospitalized had attempted suicide in the prior week and 70% had attempted suicide at some point in their lives (Cornelius et al., 1996).

4.2. Aggression, impulsivity, and suicidality

Our finding that the higher prevalence of suicide attempters and higher suicidal ideation scores in the group with a history of alcoholism, compared to the group without a history of alcoholism, is related to higher aggression scores in the former group is consistent with reports linking aggression and suicidality (Linnoila et al., 1983; Mann et al., 1999; Placidi et al., 2001; Van Heeringen, 2003). Considerable evidence suggests that suicide attempters are more aggressive than nonattempters (Linnoila et al., 1983; Mann et al., 1999; Placidi et al., 2001; Van Heeringen, 2003).

Chronic alcohol intake may lead to a state of lowered central serotonergic functioning characterized by a propensity towards disinhibited behavior, thus increasing the potential for aggressive behavior (Coccaro, 1996; Mann et al., 1999; LeMarquand, Pihl, & Benkelfat, 1994; Pihl & LeMarquand, 1998; Virkkunen et al., 1994). The relationship between aggression and lower serotonergic function is also present in psychiatric patients who do not have a history of a suicide attempt (Brown, Goodwin, Ballenger, Goyer, & Major, 1979; Hibbeln et al., 1998; Stanley et al., 2000). Given the evidence linking low serotonergic activity separately to suicidal behavior, aggression, alcoholism, and smoking (LeMarquand et al., 1994; Linnoila et al., 1983; Malone et al., 2003; Mann et al., 1999; Placidi et al., 2001; Pihl & LeMarquand, 1998; Van Heeringen, 2003; Virkkunen et al., 1994), low serotonergic activity may underlie all four conditions. Low serotonergic activity may mediate genetic and developmental effects on suicide, aggression, alcoholism, and smoking. The fact that subjects with a history of alcoholism were younger at the time of the first depressive episode and at the time of the first hospitalization than subjects without alcoholism suggests that comorbid subjects may have an inherited decrease in serotonergic activity that contributes to their morbidity. It is plausible that the causal substrates for suicidal behavior, aggression, alcoholism, and smoking involve a developmental sequence, or an interplay of predisposing factors.

Our observation that depressed subjects with a history of alcoholism have higher lifetime impulsivity scores than subjects in the nonalcoholic group is consistent with reports that, apart from its role in suicidal behavior, impulsivity is an important risk factor for the development of alcoholism (Cloninger et al., 1988; Sher, Trull, Batholow, & Bieth, 1999). We found that there was no significant difference in maximum lethality of suicide attempts

between the two groups. This supports the notion that the fact of a suicide attempt, and not the lethality of suicidal acts, is related to impulsive aggression (Placidi et al., 2001). Aggression and impulsivity are likely to have a complex effect on lethality of suicide attempts (Baca-Garcia et al., 2001). Possibly, impulsivity diminishes the planning required to inflict more severe medical damage.

We studied depressed patients without active alcoholism who were seeking treatment. Therefore, the results may not be generalizable to currently alcoholic depressed patients or those who do not seek treatment.

The results of our study indicate that depressed subjects with a history of alcoholism are more suicidal, aggressive, and more likely to be cigarette smokers than depressed subjects without a history of alcoholism. Our findings suggest that in addition to obtaining a history of depression and suicidal behavior, clinicians should assess comorbidity with alcoholism and personality traits such as aggression and impulsivity. This may help identify subjects at higher risk for suicidal behavior. Close monitoring, and psychological and pharmacological treatments may protect those subjects from suicidal behavior.

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