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ORIGINAL PAPER

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Impulsivity and aggression as predictors of suicide attempts in alcoholics

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Abstract *Introduction* The aim of this study was to assess the potential role of impulsive and aggressive behavior in the pathogenesis of suicide attempts in alcoholics. Impulsive and aggressive behavior as well as a psychiatric comorbidity with depressive conditions and personality disorders have been reported to be significant risk factors for suicide attempts in alcoholics. We hypothesized that alcoholics with a history of violent suicide attempts show an increased level of impulsive and aggressive behavior. Furthermore, the potential influence of concurrent personality disorders and depressive conditions were assessed. *Material and methods* 182 detoxified alcohol-dependent subjects were enrolled into the study. Impulsive and aggressive traits were assessed using the Buss-Durkee Hostility Inventory and the Brown-Goodwin Assessment for Lifetime History of Aggression, personality disorders using the SCID II. Characteristics of alcohol dependence and suicide attempts were evaluated using the Semi-Structured Assessment on Genetics in Alcoholism (SSAGA). *Results* Alcohol-dependent subjects with a history of suicidal behavior show a profile with higher impulsive and aggressive behavior. No significant association between these traits and concurrent borderline and antisocial personality disorder was found. Subjects with suicide attempts tended to have a significantly higher rate of depressive disorders. *Discussion* These results suggest that impulsive and aggressive traits might contribute significantly to the risk of suicide attempts in alcoholics.

Key words impulsivity · agression · suicide attempt · alcoholism

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Introduction

Some 30–40 % of male suicide attempts and 15–20 % of female suicide attempts have been considered as alcohol abusers or alcohol-dependent subjects (Rygnestadt et al. 1992). About 7–8 % of alcohol-dependent subjects complete suicide (Inskip et al. 1998). The rate of suicide attempts in alcoholics might be even higher as their attempt risk is up to 6 times higher compared to control samples (Kessler et al. 1999). The relative lifetime risk for suicide in alcoholics is 7 times higher (Gorwood 2001, Soyka et al. 1993). A previous suicide attempt increases the risk of completed suicide up to 30 times (Cremniter et al. 1998).

A number of potential risk factors for suicide attempts in alcoholics have been identified in previous research including comorbidity with psychiatric disorders such as depression, antisocial personality disorder (ASPD), borderline personality disorder (BPD) and independent and substance-induced depressive conditions (Beautrais et al. 1996, Bronisch 2000, Driessen et al. 1998, Hesselbrock et al. 1988, Preuss et al. submitted, Schuckit, 1986, Schuckit et al. 1997, Repro et al. 1997). On the (neuro-)biological level, a number of variables including monoamine oxidase B soluble interleukin-2-receptor and cholesterol have been proposed as markers of suicidal risk but were found to be nonspecific and of low predictive value. There is a large amount of literature pointing at a serotonergic dysregulation in suicidal or aggressive alcoholics (for review see Gorwood 2001). Personality traits and disorders may also be of relevance. Dimensional and quantitative traits, such as behavioral disinhibition, aggression and impulsivity, were also linked to subsequent suicidal behavior and to the use of violent methods in suicide attempts in alcoholics (Bergmann and Brismar 1994, Mezzich et al. 1997, Suominen et al. 1997). Furthermore, violent behavior has been reported to be a significant predictor of completed suicide independent of concurrent alcohol misuse (Conner et al. 2001). Recent research also demon-

strated that impulsive suicide attempts, while occurring in more than half of the documented suicide attempts, might surprisingly result in decreased lethality (Baca-Garcia et al. 2001). This astonishing relationship might be due to the subject's intention at the time of their suicide attempt. Less than 50 % of the subjects with a history of suicide attempts really wanted to die, while the reported motives otherwise have been to escape from an intolerable situation, to manipulate others (Hjelmeland, 1995) or were seen as impulsive acts of little planning (Hawton, 1986). Increased levels of anger were also linked to the use of violent methods in suicide attempts (Held et al. 1998). Other authors noted that those violent methods may more likely result in lethality (Rihmer et al. 1995), while a recent study reported no difference in the lethality depending on the suicide attempt method used (Denning et al. 2000). Thus, while there is no unanimous agreement on the prognostic validity of violent or non-violent suicide attempts, the role of impulsive and aggressive traits, personality disorders and their interaction with suicidal behavior in alcohol-dependent inpatients remains of importance for suicide research because of their contribution to its pathogenesis.

The aim of this analysis was to compare alcohol-dependent subjects with and without suicidal attempts according to their impulsive and aggressive traits in order to assess their contribution to the risk of violent and non-violent suicide attempts. After sub-grouping alcohol-dependent subjects into subjects with a history of non-violent and violent suicide attempts, we expected in our first hypothesis that alcohol-dependent subjects with violent suicide attempts to have more impulsive and aggressive traits compared to non-violent attempters. Furthermore, we hypothesized a significant interaction between these traits with antisocial (ASPD) and borderline (BPD) personality disorder. The DSM IV criteria of both ASPD and BPD include impulsivity and aggression-related items. In ASPD these are failure to plan ahead, irritability and aggression, as indicated by repeated physical fights or assaults, reckless disregard for safety of self or others and consistent irresponsibility as indicated by repeated failure to sustain consistent work behavior or honor financial obligations. In BPD they are impulsivity in at least two areas that are potentially self-damaging, affective instability due to a marked reactivity of mood and inappropriate, intense anger or difficulty in controlling anger. Furthermore, history of depressive disorders was projected to interact significantly with both subgroups of alcoholic suicide attempters.

Material and methods

Inpatient alcohol-dependent subjects were recruited from an addiction treatment ward. All patients included into the study were older than 18 years and met ICD10- and DSM-IV criteria of alcohol dependence. The alcohol-dependence and depression criteria and subject's history of suicide attempts were assessed using the SSAGA (Semi-structured interview for assessment of genetics in alcoholism, Bucholz et al. 1995, Hesselbrock et al. 1999) and a comprehensive psychiatric examination by one of the authors (UWP or MS). Patients with other concurrent axis I disorders, such as schizophrenia or bipolar disorder, were excluded. The SSAGA provides items regarding the age of onset of first suicide attempts, the number of attempts and the method used. The attempts were classified according to violence of the method. Overdose due to alcohol or sedative intake was considered nonviolent: shooting, immolation drowning, cutting, jumping and hanging were considered violent suicide attempts. Furthermore, history of major or minor depression and depressive episode's first age of onset were obtained using the SSAGA.

All patients were investigated two weeks after admission and after alcohol withdrawal free of any psychopharmacological treatment. Age of onset of alcohol dependence was assessed computing the mean of retrospectively obtained first alcohol dependence age of onset criteria as mentioned in DSM-IV by the SSAGA: higher consumption of alcohol than intended, attempts to stop or control alcohol consumption, significant time spent to consume alcohol or recover from alcohol intake, regular withdrawal symptoms during important daily obligations like school or work, reduction of important occupational or private activities, continued alcohol consumption despite the occurrence of psychological or physical harm and occurrence of 50 % higher tolerance to alcohol effects. Daily alcohol intake was obtained using the typical daily average alcohol consumption of one week during the last 30 days before admission. Pure alcohol intake was computed in grams/day. Duration of alcohol dependence was computed as the difference between age at assessment in the study and age of onset of alcoholism.

To assess the history of impulsive and aggressive behavior, the following measures were employed: the Buss-Durkee Hostility inventory (BDHI, Buss and Durkee 1957), assault and irritability sub-scores, and an adapted version of the Brown-Goodwin Assessment for Lifetime History of Aggression (BGHA, Brown et al. 1979). Both questionnaires were translated into German and back-translated by two independent persons. A total score of the BGHA and scores of the BDHI assault and irritability scales were computed. Personality disorders were assessed using SCID II-questionnaire (Wittchen et al. 1997). The diagnosis of an ASPD disorder was made, if the minimum of DSM-IV conduct disorder (antisocial traits under the age of 15) and adult antisocial disorder (antisocial traits above the age of 18) was met. The diagnosis of BPD was made, if the patients met the minimum of DSM-IV criteria. The frequency of each personality disorder was counted and additionally confirmed with a thorough psychiatric and clinical assessment by two independent psychiatrists (UWP and MS).

Ethical standards

Informed consent was obtained from patients and controls after complete and extensive description of the study. The study was approved by the ethical committee of the Ludwig-Maximilians University of Munich. All patients signed a written informed consent.

Statistics

All continuous data were tested for normal distribution. Beside descriptive statistics, the differences between BGHA scores and BDHI-impulsivity scores across subgroups were computed using one-way ANOVA. Statistical interactions between BGHA scores and BIS-impulsivity scores across groups and concurrent personality disorders (ASPD, BPD) were computed using two-way analysis of variance (ANOVA). In this analysis, aggression and impulsivity scores were entered as dependent, while personality disorders and subgroups of alcohol-dependent subjects were considered as independent factors. The statistical interaction between type of suicide attempt and history of depressive disorder was computed applying χ^2-statistic. A two-tailed α-significance level of $p < 0.05$ was defined to be statistically significant. Tukey HSD post hoc tests were conducted across groups when an overall significant difference was observed.

Results

Sample characteristics

Of the 182 patients, of whom 37 (20.3 %) were women, 76 (41.7 %) patients reported at least one suicide attempt and 63 (36.6 %) patients reported a history of at least one episode of major depression. First suicide attempt age of onset was earlier in violent suicide attempter, but failed to be significant. Age and average alcoholism age of onset did not significantly differ across groups (Table 1). However, suicidal alcohol-dependent subjects had a significantly higher alcohol intake per day compared to the non-suicidal group. A BPD was found in 34 (18.7 %); an ASPD was diagnosed in 35 (19.2 %) patients.

Impulsive traits and suicidal behavior in alcohol-dependent subjects

Alcohol-dependent subjects with a history of violent suicide attempts showed significantly increased scores in the BDHI assault scale compared to alcoholics without suicide attempts (F-value 3.09, p: 0.04; Fig. 1). However, no significant differences in the BDHI assault scores were found between violent and non-violent alcoholic subgroups. Furthermore, the three alcohol-dependent subgroups did not differ in irritability scores (F-value 1.64, p: 0.19; Fig. 2).

Life history of aggression and suicidal behavior in alcohol-dependent subjects

BGHA scales tended to be higher in alcohol-dependent subjects with a history of violent suicide attempts compared those without suicide attempts (F-value: 3.02, p: 0.05; Fig. 2). No differences in aggression scores were obtained between alcohol-dependent subjects with a history of non-violent suicide attempts and those without suicide attempts.

Statistical interaction between impulsivity, aggression and personality disorders

No statistical interaction was found concerning BDHI assault score (F-value: 0.65; p: 0.52), BDHI irritability (F-value: 1.88, p: 0.15) and BGHA total score (F-value: 0.14; p: 0.86) with concurrent borderline personality disorder in subgroups of alcohol-dependent subjects. Furthermore, no significant interaction between alcohol-dependent subgroups and concurrent antisocial personality disorder was found in BDHI assault scores (F-value: 2.16; p: 0.11) and BDHI irritability scores (F-value: 2.26; p: 0.10). However, BGHA aggression values tended to be highest in alcoholic subjects with a history of violent suicide attempts and concurrent antisocial personality disorder but failed to reach statistical significance (F-value: 2.79, p: 0.06). Patients with a concurrent BPD showed significantly higher values in BDHI assault (F-value: 11.16; p: 0.001), BDHI irritability (F-value: 19.36;

Table 1 Sample characteristics

	No suicide attempts	Non-violent suicide attempts	Violent suicide attempts	ANOVA F-value	Significance
Male/Female	83/22	42/11	19/4		
Age (years)	41.5±8.2	41.0±8.5	38.3±6.3	2.10	0.12
Age of onset (years)	29.9±9.3	28.4±8.7	26.0±6.1	1.99	0.13
Daily alcohol intake (g/d)	325.8±169.1	379.3±186.1	412.0±233.6	3.27	0.04
Suicide attempts age of onset	–	30.22±11.81	24.90±9.95	1.61	0.11*

* T-value and significance values for the comparison of violent and non-violent suicide attempters.

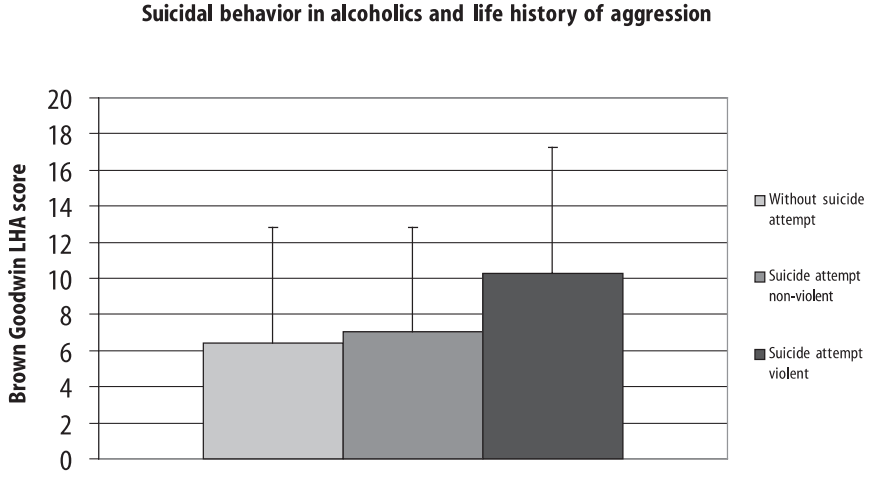

Fig. 1 Brown-Goodwin life history of aggression scores in violent, non-violent suicidal and non-suicidal alcohol-dependent subjects.

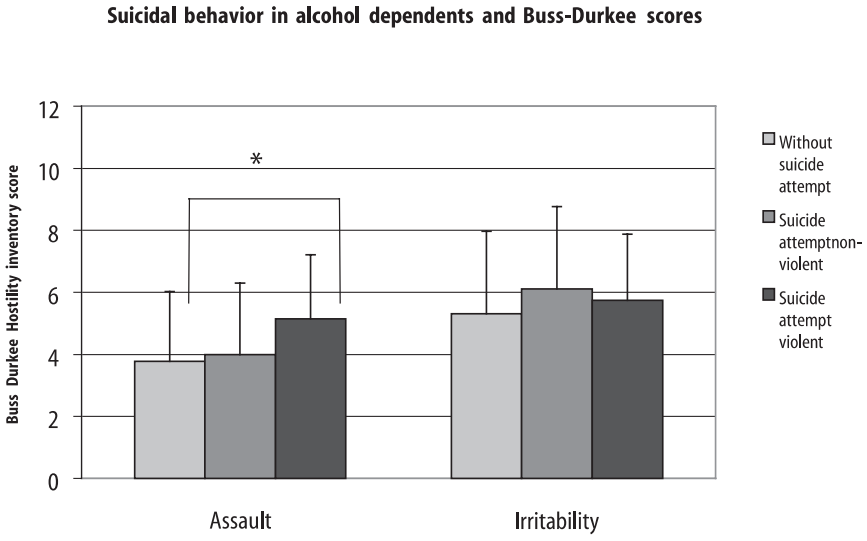

Fig. 2 Buss-Durkee Hostility inventory: assault and irritability scale scores in violent, non-violent suicidal and non-suicidal alcohol-dependent subjects.

p: 0.001) and BGHA aggression scores (F-value: 13.39; p: 0.001).

Interaction between subtypes of suicide attempts and history of depression.

Patients with suicide attempts tended to have a higher frequency of a major depression history, but failed to reach statistical significance (χ^2-value: 3.59, df: 1, sig. 0.08). No significant statistical interaction between violent, non-violent suicide attempts and history of depressive disorder was found (χ^2-value: 0.96, df: 1, sig. 0.44).

Discussion

The aim of our study was to assess impulsive and aggressive traits of alcohol dependent sub-groups with and without a history of violent and non-violent suicide attempts. We also investigated the potential statistical interaction between those traits with relevant personality disorders (ASPD and BPD) and a history of depressive disorders.

The results indicate that alcohol-dependent subjects with a history of suicide attempts have more aggressive and impulsive traits. However, no significant differences were found between alcoholics with a history of violent and non-violent suicide attempts. Thus, impulsive and aggressive traits might be significant factors in the pathogenesis of suicide attempts in alcoholics, largely independent of the method used. Our findings confirm the potential predictive role of impulsive and aggressive traits in suicide attempts. They are consistent with previous reports on increased levels of impulsive, hostile and emotionally unstable behaviors in suicide attempters compared to controls (Bergman and Brismar, 1994, Nordstrom et al. 1995).

In contrast to our second hypothesis, increased impulsive-aggressive behavior was not found to interact with a concurrent BPD or ASPD. This is surprising because both personality disorders have a significant number of impulsivity-related items in their diagnostic criteria. They have been reported to show a significantly increased level of impulsive and aggressive behavior (Evenden, 1999). However, the lack of this interaction might be due to different methods of assessment of personality traits and personality disorders. While the BDHI and BGHA assess aggression and impulsivity as sum of potentially closely related items, the DSM-IV criteria of ASPD and BPD cover a much broader spectrum of behavior, including non-impulsive characteristics of BPD and ASPD, and eventually resulting in the presence or absence of a diagnosis. Once statistically controlled for suicidal behavior in a multivariate approach, these different concepts of assessment may lead to a non-significant correlation between traits and diagnosis.

While the findings show a trend between the frequency of a history of depressive disorders and suicide attempts in alcoholics, the prevalence of depressive conditions was not significantly increased. The importance of depression as a risk factor for suicide attempts has been repeatedly noted in previous studies (Brent et al. 1988, Driessen et al. 1998, Kessler et al. 1999, Preuss et al., in press). Other studies linked concepts of overt and hidden aggression to the psychogenetic development of depression (Wolfersdorf and Kiefer, 1998, 1999). While these traits were not assessed in our study, the potential influence of different subtypes of aggressive behavior on the pathogenesis of depression and suicidal behavior remains an important objective for subsequent studies. However, depression is not the only factor determining suicidal behavior in alcoholics and might interact with a number of other variables. For instance, alcohol dependence itself and recent negative life events are related to suicidal behaivor. Both may lead to depressive conditions and potentially influence the statistical relation-

ship between the histories of suicide attempts and depression in this sample of alcoholics (Hesselbrock et al. 1988, Kingree et al. 1999, Lester 1992, Romelsjö 1995, Schuckit et al. 1997).

Of the 182 patients enrolled into the study, a significant percentage, 41.7 %, showed a history of at least one suicide attempt. This frequency is higher than in a comparable sample of 250 inpatient alcohol-dependent subjects, of which Driessen et al. (1998) reported a 29.3 % history of suicide attempts. The patients in our sample were further subdivided into groups with violent and non-violent suicide attempts. About one-fifth of the alcohol-dependent subjects met the diagnosis of BPD or ASPD. Furthermore, a 35 % history of minor or major depression was detected in our sample. These patients recruited for this study represent a sample of treatment-seeking alcoholics from an addiction treatment ward, confirming previous research reporting high frequencies of psychiatric comorbidity in inpatients (review by Preuss and Wong, 2000). Such high rates may be due to more psychiatrically ill subjects who are more prone to seek inpatient treatment in psychiatric hospitals (Berkson's Bias, Berkson 1949).

Limitations of this study are the cross-sectional and retrospective design of the study. All patients were assessed shortly before discharge from a treatment ward for alcohol dependence. Thus, prospective studies are needed to determine the role of aggressive and impulsive traits in suicide attempts. Second, the sample size is smaller compared to those from other clinical and epidemiological studies (Driessen et al. 1998, Kessler et al. 1999) limiting the generalizability of our results. Third, there were no control samples available. In this context, control samples with and without a history of self-inflicted acts would be of interest to assess the potential role of aggressive and impulsive traits in the pathogenesis of suicide attempts.

In summary, alcohol-dependent subjects with a history of violent suicidal behavior show a profile with higher impulsive and aggressive behavior, largely independent of concurrent BPD, ASPD or depressive conditions. This supports the potentially important role these traits play in the pathogenesis of suicide attempts in alcoholics.

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