Alcohol & Alcoholism Vol. 35, No. 1, pp. 70–75, 2000

SUICIDES OF ALCOHOL MISUSERS AND NON-MISUSERS IN A NATIONWIDE POPULATION

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(*Received on* 17 *February* 1999; *in revised form* 1 *June* 1999; *accepted* 25 *June* 1999)

Abstract — Alcohol dependence is a risk factor for suicide, and in the general population alcohol consumption and suicide rates are known to be associated. We investigated victims with and without alcohol misuse among unselected completed suicides to explore the role of alcohol misuse in the suicidal process and final act. In a total 1-year (1987–1988) population of suicides in the National Suicide Prevention Project in Finland, alcohol-misusing and -non-misusing victims were compared. On the basis of informant interviews, 35% (n = 349) of included victims were classified as alcohol misusers and 65% (n = 648) as non-misusers. The misusers were more often younger, male, divorced or separated and had more often worked, but were recently unemployed. They had experienced more often recent adverse life events possibly dependent on their own behaviour, were far more likely to be alcohol-intoxicated at the time of suicide, and tended to die from drug overdose. Several characteristics of these predominantly male alcohol misusers indicated better earlier lifetime psychosocial adjustment compared to the non-misusers, but more adverse life events close to suicide. Alcohol misuse is likely to have a deteriorating influence on the life course of those who eventually succumb to suicide, and its adverse consequences are common in misusers during the final months.

INTRODUCTION

Alcohol dependence is a risk factor for completed suicide (Harris and Barraclough, 1997), the lifetime risk of suicide being estimated at 7% (Inskip *et al*., 1998). In addition to current heavy drinking, interpersonal losses and difficulties, financial problems, and unemployment and job problems are frequently found in suicides of alcohol-dependent subjects (Murphy, 1992; Heikkinen *et al*., 1994). On a Finnish population level, Mäkelä (1996) reported that the fluctuations in the male suicide rate in the 15–34 and 35–49 year age groups during 1950–1991 were associated with overall alcohol consumption. A similar trend was found in the USA during 1934–1987 by Caces and Harford (1998), after controlling for unemployment. As alcohol consumption and suicide rates seem temporally related, there may be a time-related variation in the size of a population of individuals with alcohol misuse contributing to their suicide risk. In this study, we set out to characterize a subpopulation of alcohol misusers among unselected completed suicides, in order to identify features possibly related to the destructive likelihood of their alcohol misuse. Using data from a nationwide psychological autopsy study, we examined the extent to which the suicides of alcohol misusers differed from others.

SUBJECTS AND METHODS

Subjects

In the research phase of the National Suicide Prevention Project in Finland, all deaths officially classified as suicides (n = 1397) between 1 April 1987 and 31 March 1988 were recorded and analysed using the psychological autopsy method (Clark and Horton-Deutsch, 1992). The definition of suicide was based on Finnish law for determining the cause of death — in every case of violent, sudden, or unexpected death, the possibility of suicide is assessed by police and medico-legal investigations involving autopsy and forensic examinations. During this period, data collection was more comprehensive and detailed than usual. In cases of suicide, data were collected via interviews of the relatives and attending health care staff, and from psychiatric, medical and social agency records, police investigations, medico-legal examinations, toxicological analyses and suicide notes. Information was recorded in a database at the National Public Health Institute in Helsinki. Details of the methodology have been published (Henriksson *et al*., 1993).

The database included 1397 suicide cases. Information from next-of-kin interviews was available for 1155 cases, of which 12 were excluded because of incomplete interview forms. Among the remaining 1143 cases there was reliable and structured information about the use of alcohol for 997 victims, who formed the present study sample. These cases did not differ from the excluded victims in age or sex, but were more often married or cohabiting (58.1% vs 40.4%).

Alcohol misuse

The victim was recorded as having misused alcohol if reported by the informant to have been in an obvious state of drunkenness at least once or twice a week during the last year (Heikkinen *et al*., 1995*a*,*b*). A total of 349 cases were considered as misusers: 41.2% (n = 317/769) of the males and 14.0% (n = 32/228) of the females. The remaining 648 cases were thus treated as non-misusers.

To validate the concept of misuse, we investigated the agreement between informant-based misuse data and the respective DSM-III-R (American Psychiatric Association, 1987) best-estimate consensus alcohol dependence diagnoses. These had been previously assigned in a diagnostic study of a systematic random sample of 229 suicide cases, and based on all available information, including multiple interviews and health care records. In the diagnostic procedure, DSM-III-R diagnoses

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were assessed by two independent reviewers, and a consensus meeting was held in cases of diagnostic disagreement (Henriksson *et al*., 1993). Estimates of possible alcohol misuse were available for 173 of these 229 cases: 35% (60/173) were misusers and 65% (113/173) non-misusers. Misuse was assessed in 79% (n = 48/61) of the alcohol-dependent subjects, and 80% (n = 48/60) of misusers had alcohol dependence (kappa for inter-rater reliability between misuse and alcohol dependence was 0.68). For a supplementary analysis we also examined these 173 misusers and non-misusers belonging to the diagnostic sample with regard to some diagnostic and other characteristics which had been individually assessed according to all available information.

In the total population of suicides, we previously reported frequent alcohol misuse among males living alone (Heikkinen *et al*., 1995*a*), and that alcohol misusers who were currently employed were more likely to commit suicide during weekends than the unemployed (Pirkola *et al*., 1997).

Sociodemographic factors

In addition to five-class categorized data on occupational status, a dichotomy was created according to whether the victim had (regardless of current employment status) regularly worked as an entrepreneur, upper or lower level employee or manual worker. Current employment and marital status were recorded, and also whether the victim had had children.

Recent life events

The interview with the next-of-kin included a separate life-event questionnaire based on the Recent Life Change Questionnaire instrument by Rahe (1977), with some modifications from the list by Paykel *et al*. (1969). The 32 items covering events within the 3 months prior to death were classified on logical grounds into either (1) events independent of the victim's own behaviour; or (2) events possibly dependent on the victim's own behaviour. The independent events included death or severe illness of a family member, while examples of possibly dependent events were separation, serious financial setback or job problems. Included items were combined into larger categories in which more than one event was counted only once for that category. Details of the procedure have been published (Isometsä *et al*., 1995)

Previous suicidality and psychiatric treatment

Whether or not the victim had previously communicated or attempted suicide was recorded, as well as lifetime psychiatric inpatient treatment or psychiatric treatment overall.

Blood-alcohol concentration and suicide method

Blood-alcohol concentrations were determined at forensic autopsy for 95.1% (n = 948/997) of the victims, and a concentration of ≥0.10% (100 mg/dl) at the time of suicide was considered a state of alcohol intoxication. Hanging, shooting, cutting, jumping from a high place or in front of a vehicle, and deliberately crashing a vehicle were considered violent suicide methods. Fatal overdose using a solid or liquid (other than alcohol) substance was also recorded.

Statistical methods

In comparisons between groups, the χ^2-test with Yates' correction and Student's t-test were performed, both two-tailed.

The differences between the groups were analysed via univariate tables, but to control for confounding factors and to summarize the results, a backwards stepwise (likelihood ratio test) logistic model was created including the major categories of characteristics studied. Alcohol misuse was the dependent variable, and the independent variables among all major characteristics studied were: male sex, age (continuous), marital status (divorced or separated), any lifetime work, suicide communication, overdose as the suicide method, lifetime psychiatric hospitalization, recent (within 3 months) unemployment, financial problems or interpersonal loss or conflict, and alcohol detected in blood at autopsy ≥0.10%. To create a model with a large number of variables, the probability for removal was set at $P > 0.10$.

RESULTS

The results for alcohol misusers and non-misusers are presented in Table 1.

Those considered as misusers died younger than the non-misusers (42 vs 47 years, $t = 4.79$, df = 995, $P < 0.001$). Those intoxicated at the time of suicide were younger than those not, among the misusers (40 vs 43 years, $t = 2.27$, df = 332, $P = 0.024$) and particularly the non-misusers (38 vs 48 years, $t = 4.39$, df = 612, $P < 0.001$).

Life events

More of the misusers had experienced any life events within the last 3 months (87 vs 76%, $\chi^2 = 15.66$, df = 1, $P < 0.0001$); four-fifths had had life events possibly dependent on their own behaviour compared to only half of the non-misusers (Table 1). Within the last 3 months, more of the male misusers compared with non-misusers had experienced interpersonal loss (38 vs 18%, $\chi^2 = 32.53$, df = 1, $P < 0.0001$), loss or conflict (55 vs 27%, $\chi^2 = 52.03$, df = 1, $P < 0.0001$), financial problems (27 vs 13%, $\chi^2 = 20.03$, df = 1, $P < 0.0001$), or unemployment (27 vs 11%, $\chi^2 = 31.03$, df = 1, $P < 0.0001$). Among females, more of the misusers had experienced financial problems (29 vs 9%, $\chi^2 = 7.84$, df = 1, $P = 0.005$) or unemployment (29 vs 3%, $\chi^2 = 21.45$, df = 1, $P < 0.0001$).

Psychiatric contacts

The misusers had psychiatric hospitalizations and any psychiatric treatment less frequently than the non-misusers, but previous suicide attempts and suicide communication more often (Table 1). Among both groups, those without any lifetime psychiatric contacts were more likely to be intoxicated at the time of suicide than those with any psychiatric treatment (66 vs 48%, $\chi^2 = 10.60$, df = 1, $P = 0.001$, 19 vs 9%, $\chi^2 = 10.91$, df = 1, $P = 0.001$).

Blood-alcohol concentration and suicide method

Suicide methods and the proportions of victims with alcohol in the blood appear in Table 2.

Among misusers, alcohol in blood did not associate with any recent life events, whereas non-misusers unemployed within the final 3 months were significantly more often intoxicated (35 vs 11%, $\chi^2 = 20.30$, df = 1, $P < 0.0001$) than other non-misusers.

Table 1. The characteristics of suicide victims with alcohol misuse and no misuse

Characteristic	Misusers (*n* = 349)		Non-misusers (*n* = 648)			
	n	%	*n*	%	χ^2	*P*
Sex						
male	317	91	452	70		
female	32	9	196	30	55.944 (df = 1)	<0.00001
Age groups						
<35 years	108	31	189	29		
35–49 years	151	43	177	27		
≥50 years	90	26	282	44	37.417 (df = 2)	<0.00001
Marital status						
married	121	35	258	40		
separated or divorced	78	22	73	11		
widowed	11	3	61	9		
unmarried	139	40	256	40	33.197 (df = 3)	<0.00001
children	213/321	66	342/608	56	8.504 (df = 1)	0.004
Occupational status						
entrepreneur or employer	27	8	52	8		
employee	41	12	90	14		
manual worker	194	56	178	28		
retired	80	23	287	46		
other	3	1	19	3	81.899 (df = 4)	<0.00001
Employment						
any lifetime employment	262	75	320	49	60.552 (df = 1)	<0.00001
currently employed	171	49	261	40	6.673 (df = 1)	<0.01
unemployed within last 3 months	88	25	52	8	54.118 (df = 1)	<0.00001
Suicidality						
previous attempts	171/327	52	276/627	44	5.582 (df = 1)	0.018
suicide communication	255/343	74	396/642	62	15.433 (df = 1)	0.00009
suicide note	100	29	176	27		n.s.
Suicide method						
violent	215	62	433	67		n.s.
intoxication	77	22	103	16	5.423 (df = 1)	<0.02
Psychiatric treatment						
inpatient	112	32	276	43	10.085 (df = 1)	0.0015
any	176	50	375	58	4.783 (df = 1)	0.029
Life events within last 3 months						
interpersonal loss or conflict	164/306	54	176/589	30	47.070 (df = 1)	<0.00001
financial problems	84/310	27	71/603	12	33.025 (df = 1)	<0.00001
independent	110/303	36	264/593	45	5.233 (df = 1)	0.022
dependent	245/309	79	305/590	52	63.854 (df = 1)	<0.00001
Alcohol intoxication						
alcohol in blood	231/334	69	139/614	23	194.808 (df = 1)	<0.00001
BAC ≥0.10	190/334	57	81/614	13	200.172 (df = 1)	<0.00001

BAC, blood-alcohol concentration.

Psychiatric comorbidity among misusers and non-misusers in the diagnostic sample

Within the diagnostic sample, some differences were found between the misusers (*n* = 60) and non-misusers (*n* = 113). A DSM-III-R depressive disorder not otherwise specified was more common among the misusers (35%, *n* = 21/60 vs 19%, *n* = 21/113, χ^2 = 4.89, df = 1, *P* = 0.027), whereas major depression (MD) was more common among the non-misusers (42%, *n* = 47/113 vs 22%, *n* = 13/60, χ^2 = 6.02, df = 1, *P* = 0.014). Misusers were more likely to have been diagnosed with any DSM-III-R personality disorder (43%, *n* = 26/60 vs 26%, *n* = 29/113, χ^2 = 5.45, *P* = 0.02) and less often with a non-organic psychosis (psychotic MD included) (13%, *n* = 8/60 vs 37%, *n* = 42/113, χ^2 = 9.71, df = 1, *P* = 0.001). Regular treatment with antipsychotic drugs had been prescribed in 8% (*n* = 5/60) of the misusers and 30% (*n* = 34/113) of the non-misusers (χ^2 = 9.41, df = 1, *P* = 0.0022), the respective figures for benzodiazepine treatment being 8% (*n* = 5/60) and 28% (*n* = 32/113) (χ^2 = 8.16, df = 1, *P* = 0.004) and for antidepressant medication 7% (*n* = 4/60) and 20% (*n* = 22/113) (χ^2 = 4.08, *P* = 0.04).

The logistic model

The logistic model (Table 3) predicted alcohol misuser status in 78%. Male sex, being divorced or separated, suicide communication, overdose as the method, any lifetime work, unemployment, financial problems or interpersonal loss or conflict within 3 months, and alcohol intoxication at the time of suicide, were partially associated with alcohol misuse (Table 3).

Table 2. Suicide method for male and female misusers and non-misusers and percentages of victims with alcohol detected in blood

	Misusers (n = 317)			Non-misusers (n = 452)		
	n	%	% with alcohol in blood	n	%	% with alcohol in blood
Males (n = 769)						
overdose	53	17	69	41	9	48
hanging	109	34	63	159	35	22
drowning	10	3	70	26	6	9
exhaust gas	38	12	82	44	10	35
shooting	78	25	75	132	29	30
other	29	9	63	50	11	15

χ^2 = 14.595, df = 5, P = 0.012 (for differences in suicide methods between misusers and non-misusers)

	Misusers (n = 32)			Non-misusers (n = 196)		
Females (n = 228)						
overdose	24	75	61	62	32	20
hanging	3	9	67	69	35	12
drowning	2	6	100	26	13	8
exhaust gas	1	3	100	4	2	0
shooting	0	0		3	2	0
other	2	6	100	32	16	14

χ^2 = 23.549, df = 5, P = 0.0003 (for differences in suicide methods between misusers and non-misusers)

DISCUSSION

Among all suicides during a 1-year period in Finland, we found that those with alcohol misuse differed from non-misusers in several characteristics that seemed to indicate a somewhat better lifetime psychosocial adjustment, but also more problems close to suicide in their interpersonal life and occupation.

Alcohol misusers

Compared to the non-misusing suicide victims, the alcohol misusers tended to be younger, male, more frequently divorced or separated from a marriage and to have children. They were more likely to have worked, usually in manual jobs, whereas the non-misusers were very often retired. In accordance with observations by Hayward *et al*. (1992), the misusers had received psychiatric treatment less often. These findings suggest a somewhat higher psychosocial status among the misusers, and perhaps a smaller burden of long-standing psychiatric morbidity and psychosocial stress. However, they were also more likely to have experienced disruption in their lives and committed suicide while drunk. The problems of the misusers in the areas of finance, work and personal relationships were doubtless partly a consequence of their excessive drinking, although perhaps also related to their more prevalent personality disorders. These factors are generally known predictors of poor outcome (Heikkinen *et al*., 1995*b*; Pirkola *et al*., 1999). Moreover, the corrosive influence of habitual misuse may have heightened the vulnerability to suicide in cases with recent adversity. As an example, 75% had regularly worked at some time, but only half were currently employed, a quarter having experienced unemployment within the last 3 months. These findings in the suicidal process of an alcohol misuser imply a relatively smaller loading of long-standing contributing factors other than problematic alcohol use *per se* with its both short- and long-term consequences.

Table 3. Logistic model with alcohol misuse as the dependent variable

Variable	P-value	OR	95% CI
Male sex	0.00	4.21	2.43– 7.29
Divorced/separated	0.03	1.71	1.04–2.80
Any lifetime employment	0.00	1.76	1.19–2.60
Suicide communication	0.00	1.79	1.22–2.64
BAC >0.10% (>100 mg/dl)	0.00	5.94	4.06–8.70
Overdose as suicide method	0.01	1.99	1.21–3.26
Unemployed within last 3 months	0.00	2.20	1.34–3.62
Financial problems within last 3 months	0.07	1.54	0.97–2.44
Loss or conflict within last 3 months	0.00	2.19	1.53–3.15

OR, odds ratio; CI, confidence interval; BAC, blood-alcohol concentration.

Alcohol and the method of suicide

With regard to the final act of suicide, alcohol has been suggested to impair judgement, cause impulsivity and contribute to the choice of method (Welte *et al*., 1988; Hayward *et al*., 1992; Öhberg *et al*., 1996). In spite of our finding that the misusers of both sexes had far less often been prescribed psychopharmacological medication, death by intoxication with a liquid or solid substance tended to characterize their suicides. The possible potentiating effect of alcohol on the lethality of another substance used for suicide may partly explain these intoxication suicides as well as the high proportion of misusers with alcohol in the blood.

The role of recent life events

The analysis within the random sample showed that the alcohol misusers in this study resembled alcohol-dependent suicide victims studied earlier (Murphy and Robins, 1967; Murphy, 1992; Heikkinen *et al*., 1994), and thus partly confirmed these findings in an unselected nationwide population. Recent interpersonal and employment problems were associated with alcohol misuse, which also accords with previous studies. The misusers had more events possibly dependent on their own behaviour, probably relating to psychosocial disruption in the structure of their personal life caused by excessive drinking, and maladaptive functioning in cases of comorbid personality disorders. Moreover, a specific vulnerability and current drinking may well be important contributors to the final act (Murphy *et al*., 1992).

Studies on alcohol consumption and suicide rate

According to Mäkelä (1996), the suicide rate of younger Finnish males is associated with alcohol consumption, and similar findings are reported elsewhere (Caces and Harford, 1998). In Finland, heavy drinking and intoxication account for a large proportion of overall alcohol consumption, and alcohol-related problems concentrate in a heavy drinking minority (Simpura, 1987). The alcohol-misusing suicide victims in our nationwide psychological autopsy study were almost exclusively male and three-quarters were aged <50 years. While it is tempting to see them as a key group with regard to temporal variation in suicide rates, they had other psychiatric morbidity (Henriksson *et al*., 1993; Pirkola *et al*., 1999), recent adverse changes and disintegration in their life structure, besides a history of abundant drinking. In general, when combined with psychiatric disorders, alcohol misuse probably predisposes an individual to a particular type of suicide process characterized by disturbances in life course. In this sense, alcohol consumption — via alcohol-related problems among individuals at risk — may have the potential to cause variation in suicide rates, and thus to explain part of the international differences in them.

The non-misusing victims

It is likely that the population of non-misusers in this study consisted of heterogeneous, but basically more psychiatrically ill, victims than the misusers. The supplementary analysis within the diagnosed random sample supports this, revealing more major depressive disorders and non-organic psychotic disorders, as well as more antipsychotic and benzodiazepine treatment among the non-misusers. The association of recent unemployment and alcohol intoxication among the non-misusers may reflect reactive drinking to adversity among some individuals, which is interesting in the light of general reports on unemployment and suicide (Pritchard, 1992).

Methodological issues

Some methodological limitations need to be noted. First, there were no living controls from the general population. Second, by necessity, only retrospective and second-hand information is available in psychological autopsy studies. In the evaluation of life events, recall bias, a tendency to explain suicide (‘effort after meaning’) and the limits of the questionnaire may have caused either under- or over-reporting of events. Furthermore, although the classification of possibly dependent and independent events was made on logical grounds, the true intentionality of dependent events is beyond reach. These problems have been discussed earlier (Miller *et al*., 1986; Heikkinen *et al*., 1994; Isometsä *et al*., 1995). Third, a number of cases had to be excluded from the total suicide population on the basis of missing, incomplete or unreliable interviews. In addition, some cases among those with interviews had insufficient reliable and structured information about the victim’s use of alcohol, and were also excluded. However, these individuals did not differ from the included cases in terms of sex, age, or current employment, though they tended to be married or cohabiting less often. Fourth, the size of the study population precluded detailed examination of individual alcohol use in the light of all available information, so the informant’s estimate of the victim’s pattern of heavy drinking was the sole source used to categorize their alcohol use, which may have led to under-reporting of any problems with alcohol. Finally, due to the relatively high number of univariate tests, the possibility of spurious associations cannot be fully excluded. Nevertheless, we think that the size of the population and use of a logistic model offered some protection against this possibility. Furthermore, the convergence of the findings with what is already known supports their reliability.

GENERAL CONCLUSIONS

Alcohol misusers who kill themselves are more likely than other suicide victims to be male, to have relatively good psychosocial coping until recent disruption — particularly by unemployment and interpersonal adversities — and to perform their final act in a state of drunkenness. Their difficulties seem to be partly a consequence of their own behaviour, frequently excessive alcohol use. They often communicate their suicidal intent and choose overdose as the method, the lethality of which is likely to be increased by inebriation. Alcohol misuse may well be an important contributing factor to the suicidal process of a considerable proportion of suicide completers, and, as such, should justify more attention in the context of alcohol use and suicide risk.

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