

Short communication

The suspected association between methamphetamine ('ice') smoking and frequent episodes of alcohol intoxication: data from the 1993 National Household Survey on Drug Abuse

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Abstract

This study estimates the strength of association between frequent episodes of alcohol intoxication and recent smoking of methamphetamine ('ice'). Drawn from the 1993 National Household Survey on Drug Abuse, a total of 101 ice smokers were matched on neighborhood of residence to 816 non-smokers. Based upon conditional logistic regression analyses, persons with daily episodes of alcohol intoxication were an estimated five times more likely to have smoked ice, as compared with non-drinkers or drinkers with little or no history of alcohol intoxication. This estimate includes statistical adjustment for potential confounders (e.g. age, sex) and was statistically significant ($P = 0.01$). The association between frequent alcohol intoxication and 'ice smoking' offers an intriguing lead for a broad range of new research. © 2000 Elsevier Science Ireland Ltd. All rights reserved.

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1. Introduction

This study examines whether frequent episodes of alcohol intoxication might signal an increased risk of 'ice-smoking', which has emerged in isolated outbreak and epidemic form in the United States, Asia, and the Pacific Islands. 'Ice' is a recent slang term for the smokable isomer of methamphetamine, namely D-methamphetamine (Fischman, 1995). 'Ice smoking' involves inhaling volatile fumes from a glass pipe or similar apparatus used to heat the stimulant drug compound (Morgan and Joe, 1997). Recently, the outbreaks of 'ice smoking' have spread eastward and northward from the southwestern United States [National Institute on Drug Abuse, 1998], and have drawn attention from investigators worldwide.

Hypotheses regarding an association with daily alcohol intoxication arose during clinical and field interviews with ice smokers who had sought treatment during a recent methamphetamine epidemic in the Mariana Islands, Micronesia. A subsequent review of the literature identified concordant epidemiological and clinical findings, as well as some intriguing data about an association between ice and alcohol use from pharmacological studies. For example, methamphetamine use has been found to occur more frequently among persons who meet DSM-III-R criteria for alcohol dependence (Caetano and Weisner, 1995). In addition, a recent laboratory study of the subjective effects of co-administration of alcohol and methamphetamine found that users experience an increase in the overall perception of intoxication and a decrease in the perception of alcohol-specific intoxication (Mendelson et al., 1995). Attempting to explain these findings, Mendelson et al. suggested that heavy drinkers might use methamphetamine to counteract or reverse the depressant effects of ethanol while still maintaining an overall feeling

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of intoxication. It also has been suggested that alcohol and ice are used to “fine-tune or titrate” mood states (US Department of Health Human Services, 1997; Mendelson et al., 1995).

In light of findings such as these, and the recently increased concern about methamphetamine users in the United States, new investigations are needed to look into the association between alcohol intoxication and ‘ice smoking’. To determine whether this association might be worthy of more deliberate prospective and longitudinal research, this study seeks to quantify the strength of association between daily alcohol intoxication and ice smoking using a combination of epidemiological and biostatistical procedures to hold constant other conditions that might distort the estimation of this association. Data from the public use datafiles of the 1993 National Household Survey on Drug Abuse (NHSDA) are used to answer this question. It was not possible to base this research on more recent data because questions regarding ice smoking have not been included in the publicly available NHSDA survey data since 1993.

2. Methods

The data used in this report were collected and released in a public use data set from the 1993 National Household Survey on Drug Abuse (NHSDA). The NHSDA is designed to provide cross-sectional information about the patterns of drug use among household residents of the United States, age 12 years and older (Substance Abuse and Mental Health Services Administration, 1995). A multi-stage area probability sampling design is employed to select household respondents for the survey, with some groups (e.g. Hispanics) having a higher probability of selection than others. In 1993, a total of 26 489 individuals were interviewed, representing a survey response rate of 79%. NHSDA assessments are based primarily upon self-administered questionnaires, with an interview option when preferred by the respondent. Details about NHSDA sampling and assessment methods are provided in detailed reports published by Substance Abuse and Mental Health Services Administration (for example, see Substance Abuse and Mental Health Services Administration, 1995, 1996, 1997).

In the present study, alcohol intoxication is measured in terms of self-rated alcohol consumption in the year prior to assessment leading to (a) less than almost daily intoxication (less than three times per week), (b) almost daily intoxication (three to six times per week), and (c) daily intoxication. Abstinence from drinking and drinking with no episodes of intoxication also were assessed in relation to the year just prior to assessment. Recent ice smoking refers to use versus no use of ice in the year prior to the interview. Similarly, other drug use refers to

the use of any of the following drugs in the past year: marijuana, cocaine, crack-cocaine, heroin, or inhalants. Age, sex, race-ethnicity, and educational attainment were also measured by means of standardized questions.

A total of 101 respondents in the 1993 NHSDA sample reported recent ice use. These ice smokers resided in a total of 83 block groups or sample segments. A sample segment is defined by the NHSDA as an aggregation of census blocks and enumeration districts with at least 90 occupied dwelling units, and will be referred to hereinafter as a ‘neighborhood’ (Substance Abuse and Mental Health Services Administration, 1995). A post-stratification procedure was used to match ice smokers with non-smokers who were living in the same neighborhoods. Therefore, in neighborhoods with at least one ice smoker, all non-ice smokers living in the same neighborhoods were included in the analyses as a control group. This post-stratification procedure matches cases (ice smokers) with controls (non-ice smokers) by constraining potential confounding but unmeasured neighborhood characteristics such as police presence, social disadvantage, and social tolerance for intoxication. This technique controls for these community-level factors even though they were not directly measured by the survey. This matching strategy is based on the assumption that people living in the same neighborhood share environmental conditions to a greater degree than persons living in different neighborhoods. While many of the characteristics of environment such as availability of ice or local attitudes about drug use are not directly measured by the NHSDA, the neighborhood-matching strategy allows these factors to be constrained by contrasting ice-smokers to non-smokers living within the same neighborhoods.

The matched data were analyzed using the conditional form of multiple logistic regression (CLR) with the software EGRET (Statistics and Epidemiologic Research Corporation, 1993). Odds ratios were estimated to assess the strength of the association, with and without statistical adjustment for the possibly distorting influences of age, sex, race-ethnicity, education, and other drug use in the past year (i.e. marijuana, heroin, cocaine, crack-cocaine, and inhalants). The post-stratification and CLR methods used here are the same as have been used in past investigations, where the procedure and rationale for matching are described in more detail (for example, Anthony and Petronis, 1991; Wagner-Echeagaray et al., 1994; Delva et al., 1998).

The ‘population attributable risk’ (PAR) was estimated for daily alcohol intoxication in order to convey the potential public health significance of this suspected cause. The method of estimating PAR, described in Gordis (1996), involves a function of the prevalence of ice smoking, and the relative association between icesmoking and daily intoxication. Consistent with

Gordis (1996), the PAR is interpreted as the estimated proportion of ice smoking that might be eliminated by reducing the population level of daily intoxication, under the assumption that the estimated association accurately reflects the causal influence of daily intoxication.

3. Results

Table 1 presents selected characteristics of ice smokers and matched non-smokers, including an observed association between ice smoking and alcohol intoxication. Table 2 shows the occurrence of recent ice smoking to be an estimated eight times greater among persons who reported recent daily alcohol intoxication as compared with non-drinkers (estimated odds ratio (OR) = 7.96; 95% confidence interval (CI) = 2.5, 25.3). The association of recent ice smoking and recent daily alcohol intoxication remained quite strong even after adjustment for age, sex, race, education, and other drug use (adjusted OR = 5.07; 95% CI = 1.48, 17.37). Recent drinkers with no episodes of intoxication were similar to non-drinkers with respect to ice smoking: both had an equally low occurrence of ice smoking (Table 2).

It is noteworthy that other recent drug use also was moderately associated with the occurrence of ice smoking. Among the 197 respondents who reported recent

use of other drugs, 21.3% reported using ice. Ice smoking among these drug users was three times more common than in persons with no other recent drug use (adjusted OR = 3.22; 95% CI = 1.82, 5.72). In addition, there was an inverse association between years of education and the occurrence of ice smoking (adjusted OR = 0.86; 95% CI = 0.78, 0.94), and an estimated 4.7 times greater occurrence of ice smoking among respondents of “other” racial/ethnic backgrounds as compared with their White non-Hispanic neighbors (adjusted OR = 4.7; 95% CI = 1.08, 20.44).

4. Discussion

In this study, we found that daily alcohol intoxication is associated with the occurrence of ice smoking. This relationship is independent of associations between ice smoking and other recent drug use, age, sex, race-ethnicity, education, and the shared aspects of local area characteristics that were held constant by neighborhood matching. There is no excess in the occurrence of ice smoking among persons reporting recent alcohol use but no recent episodes of intoxication.

Before discussing these findings in detail, two limitations of this study merit specific attention. First, the study’s self-report data were collected cross-sectionally without information about the temporal sequence of ice

Table 1
Selected characteristics of past year ice smokers and non-ice smokers (National Household Survey on Drug Abuse, 1993)

Characteristic	Ice users (<i>n</i> = 101)		Non-ice users (<i>n</i> = 816)		<i>P</i> value ^a
	<i>n</i>	%	<i>N</i>	%	
<i>Sex</i>					
Male	46	45.5	394	48.3	0.60
Female	55	54.5	422	51.7	
<i>Race</i>					
White	33	32.7	280	34.3	0.10
Black	27	26.7	173	21.2	
Hispanic	37	36.6	344	42.2	
Other	4	4.0	19	2.3	
Mean age (standard deviation)	28.0	(1.2)	27.1	(0.4)	0.23
Mean years education (standard deviation)	10.2	(0.3)	10.9	(0.1)	0.03
Other drug use ^b	42	41.6	155	19.0	<0.01
Past year cigarette use	61	60.4	334	40.9	<0.01
<i>Frequency of alcohol intoxication in past year</i>					
Never drank	24	25.5	263	33.9	<0.01
Did not drink in past year	3	3.2	73	9.4	
No intoxication	17	18.1	202	26.0	
Intoxicated less than almost daily	38	40.4	218	28.1	
Intoxicated almost daily	5	5.3	12	1.5	
Intoxicated daily	7	7.4	8	1.0	

^a The *P* value is from the bivariate regression analyses.

^b Use of marijuana, cocaine, crack-cocaine, heroin, or inhalants in the past year.

Table 2

Estimated strength of association between level of alcohol intoxication and history of smoking ice in the year prior to the interview^a

Characteristic	Unadjusted model			Adjusted model ^b		
	Odds ratio	<i>P</i> value	95% Confidence interval	Odds ratio	<i>P</i> value	95% Confidence interval
Age (in years)	1.01	0.230	(0.99, 1.03)	1.03	0.007	(1.01, 1.04)
<i>Sex</i>						
Male	1.00	–	–	1.00	–	–
Female	0.90	0.614	(0.59, 1.37)	0.74	0.215	(0.47, 1.19)
<i>Race</i>						
White	1.00	–	–	1.00	–	–
Black	1.10	0.820	(0.48, 2.55)	1.19	0.705	(0.49, 2.90)
Hispanic	0.48	0.082	(0.21, 1.10)	0.44	0.081	(0.18, 1.11)
Other	2.22	2.54	(0.56, 8.78)	4.70	0.039	(1.08, 20.44)
Education (in years)	0.92	0.027	(0.85, 0.99)	0.86	<0.001	(0.78, 0.94)
Other drug use ^c	3.42	<0.001	(2.13, 5.50)	3.22	<0.001	(1.82, 5.72)
<i>Frequency of alcohol intoxication in past year</i>						
Never drank	1.00	–	–	1.00	–	–
Did not drink in past year	0.50	0.262	(0.15, 1.69)	0.45	0.217	(0.13, 1.60)
No intoxication	1.10	0.784	(0.57, 2.15)	1.09	0.812	(0.53, 2.24)
Intoxicated less than almost daily	2.11	0.010	(1.20, 3.73)	1.71	0.116	(0.88, 3.33)
Intoxicated almost daily	3.86	0.025	(1.19, 12.57)	1.70	0.116	(0.45, 6.35)
Intoxicated daily	7.96	<0.001	(2.50, 25.30)	5.07	0.010	(1.48, 17.37)

^a Results of multiple conditional logistic regression with matching on neighborhood of residence. Data from the National Household Survey on Drug Abuse, 1993.

^b Adjusted for all the characteristics in the table.

^c Use of marijuana, cocaine, crack-cocaine, heroin, or inhalants in the past year.

smoking and alcohol intoxication. Therefore, it is impossible to determine the sequence that links daily alcohol intoxication with ice smoking and, in this study, we cannot rule out spurious associations due to unreliable self-reports of frequently intoxicated respondents. A potentially important association has been detected, but it cannot be clarified whether daily intoxication precedes ice smoking, ice smoking precedes daily intoxication, whether they affect one another reciprocally, or whether they are spuriously associated. A second limitation relates to the issue of spurious association and possible mis-specification of the model used for estimation purposes. That is, via matching, the influence of many socially shared confounding variables within the neighborhoods of ice-smokers was constrained, and via multiple logistic regression, other potentially distorting variables were controlled. Nonetheless, some potentially confounding variables not measured in the NHSDA, such as background personality traits (e.g. anti-social personality disorder), have not been controlled. This issue of mis-specification of the causal model remains at the forefront of an agenda for future research on the suspected causal link between alcohol intoxication and ice smoking.

Despite limitations such as these, to our knowledge, this is the first study to present evidence of a moderately strong relationship between daily alcohol intoxica-

tion and ice smoking in a nationally representative sample of the US household population. This study also yielded some new evidence on the association between race-ethnicity, education, and the occurrence of ice smoking, within the framework of multiple conditional logistic regression. Perhaps of most interest for future research on race-ethnicity and ice smoking is the higher occurrence of ice smoking observed among respondents in the “other” racial/ethnic category. In fact, all of the ice smokers in the “other” category were of Asian/Pacific Islander background. This finding converges with separate evidence of methamphetamine use along the Pacific Rim and among Asian and Pacific Islanders in Hawaii (Morgan and Joe, 1997). In addition, the majority of the ice-smokers (53%) in the sample resided in the southern region of the United States as opposed to the northeastern (7%), north central (12%), or western (28%) portions of the United States.

In future investigations with larger sample sizes, it might be possible to tease apart separate relationships involving tobacco smoking and daily intoxication. In this sample, the use of alcohol and tobacco were too closely associated to be disentangled. Hence, a larger sample is needed to clarify our understanding of this three-way association, and also to illuminate ice use and alcohol intoxication among persons of specific

racial and ethnic backgrounds, and in varying regions of the United States.

We must draw the reader's attention to the fact that most persons who become intoxicated while drinking do not smoke ice, just as most persons who smoke tobacco do not develop lung cancer. This fact does not undercut the potential causal or public health importance of daily alcohol intoxication with respect to ice smoking. Under the assumption that the observed association is well estimated, and that daily alcohol intoxication promotes ice smoking, we can estimate the PAR as an indicator of public health importance. Using standard methods (Gordis, 1996), we estimate the PAR for daily alcohol intoxication to be 5%. That is, under the assumptions for estimating PAR, an estimated 5% of ice smoking is attributable to daily intoxication. Hence, the observed association is large enough to merit further attention, even though it is not overwhelming from a public health perspective.

Finally, it will be useful to investigate whether the observed association between frequent intoxication and ice use is specific only to ice and other psychostimulants, or if it exists for other drugs as well. If there exists a broad profile of strong associations between daily alcohol intoxication and the use of many different illicit drugs, this would not contradict our findings on ice smoking and getting drunk. Rather, we might regard daily alcohol intoxication in relation to ice smoking in the same way we regard unsafe sex in relation to HIV infection. The fact that unsafe sex also leads to syphilis, gonorrhea, and other infections does not undermine the public health importance of unsafe sex with respect to HIV or any other sexually transmitted infection.

With respect to the alcohol–ice association specifically, it is plausible that heavy drinkers use ice to counteract the performance deficits arising from the depressant effects of alcohol. A person who drinks heavily might use ice to improve cognitive performance without affecting the overall experience of intoxication. The previously mentioned work of Mendelson et al. (1995) lends support to this hypothesis, but more laboratory research is needed to verify this mechanism, just as new epidemiologic research will help us to disentangle the temporal sequencing of the observed relationship and rule out possible sources of spurious association.

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