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Prevalence and Correlates of Withdrawal-Related Insomnia among Adults with Alcohol Dependence: Results from a National Survey

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Abstract

Insomnia during acute alcohol withdrawal (AWD) as well as persisting insomnia during post-acute withdrawal is associated with relapse. Rates of insomnia in clinical samples of alcohol-dependent patients range from 36 to 91%, but the prevalence of AWD-related insomnia in the general population is unknown. The purpose of this study was to describe the prevalence of insomnia as a symptom of acute AWD and its correlates in a general population of alcohol-dependent individuals. Data were analyzed from the 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), which sampled 43,093 adults. The prevalence of AWD-related insomnia among individuals with a lifetime diagnosis of alcohol dependence was 31.7%, which ranked fourth among the eight listed DSM-IV withdrawal symptoms. Among individuals that met lifetime criteria for both alcohol dependence and AWD, the prevalence of insomnia was approximately 50%. Lifetime diagnoses of major depression and drug use disorders were significant correlates of AWD-related insomnia in multivariate analyses. A less than one-year duration of the heaviest drinking period as well as the onset of alcohol dependence between ages 18 and 27 were negatively associated with AWD-related insomnia. AWD-related insomnia is a common symptom among alcohol-dependent adults in the general population and is related to lifetime co-occurring diagnoses, age at onset of alcohol dependence, and duration of heaviest drinking period. Its prevalence in the general population provides a representative base rate against which to compare the widely varying rates reported in clinical populations. Because of its relatively frequent prevalence and association with relapse, assessment and treatment of AWD-related insomnia should be routinely considered in clinical settings.

Introduction

The diagnostic criteria for alcohol withdrawal (AWD) in DSM-IV include eight signs and symptoms that may develop within hours to days after cessation of, or reduction in, heavy and prolonged alcohol use.1 The presence of two or more of these eight signs and symptoms are required for the diagnosis, including autonomic hyperactivity, increased hand tremor, insomnia, nausea or vomiting, transient hallucinations or illusions, psychomotor agitation, anxiety, and grand mal seizures. Little is known about the frequency or correlates of these symptoms among individuals with alcohol dependence in the general population. Caetano et al.2 published data on the prevalence of selected withdrawal symptoms in three waves of the

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National Alcohol Survey during 1984, 1990, and 1992, respectively, but insomnia was not included in those analyses.

Insomnia is an important problem among alcohol-dependent individuals because it is common, persistent, and associated with relapse.3 Among clinical populations, between 36 and 91% of patients report insomnia either while drinking or within several weeks of stopping.4-6 When rates are averaged across eight studies known to the authors, 56% of 2,075 alcohol-dependent patients had insomnia, although definitions for insomnia and its temporal relationship to alcohol withdrawal varied by study.4-6 Indeed, insomnia may precede the development of heavy drinking and alcohol dependence,7 begin during a period of heavy drinking, or develop and worsen during alcohol withdrawal. While acute alcohol withdrawal generally lasts no more than one week, some signs and symptoms such as insomnia, anxiety and autonomic dysfunction may persist for 3-6 months or more.1 The persistence of insomnia and other withdrawal symptoms deserves special interest because of their association with relapse,3 however, the severity of insomnia during the acute withdrawal period may also lead to early return to drinking.8

Although fairly well-studied in clinical populations, the prevalence of AWD-related insomnia among alcohol-dependent individuals in the general population is unknown. Knowledge about insomnia as a withdrawal symptom in the general population would be valuable to establish a representative base rate against which to compare the widely varying rates in clinical populations. Presumably, AWD-related insomnia would be more common among clinical samples, because insomnia can cause distress that leads to seeking treatment. Furthermore, not all physiologically dependent patients experience insomnia during alcohol withdrawal, raising the question of what differentiates those who do from those who do not.

Accordingly, the purpose of this study is to describe (1) the prevalence of insomnia as a symptom of alcohol withdrawal, and (2) the correlates of AWD-related insomnia in a general population of alcohol-dependent individuals. A description of its prevalence and correlates in the general population may serve to draw attention to the extent of the problem and its clinical implications.

Methods

Subjects, Sampling, and Interviews

This study reports findings based on data from the 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). NESARC includes a representative sample of 43,093 U.S. adults.9 The survey gathered information on substance use and comorbid conditions from individuals living in households and group settings. NESARC utilized a multistage sampling design and had an overall response rate of 81%. Data were weighted at the individual and household levels and adjusted for oversampling, for nonresponse, and to be representative of the U.S. population as assessed during the 2000 census.

U.S. Census Bureau workers administered the Alcohol Use Disorders and Associated Disabilities Interview Schedule (AUDADIS-IV). AUDADIS is a structured interview designed for administration by trained lay interviewers. AUDADIS-IV assesses DSM-IV substance use disorders with good reliability.10,11 The NESARC survey, sampling protocol, related publications, and codebook are available at http://niaaa.census.gov/.

Measurement

Alcohol dependence—This study included survey respondents who met lifetime DSM-IV criteria for alcohol dependence. Reliability for past-year and prior to past-year

occurrence for any alcohol use disorder was good (κ = .76 and .73, respectively).10 Age at onset of alcohol dependence was also included in this study.

Insomnia—Subjects with a lifetime history of alcohol use were asked if they ever experienced each of eight different withdrawal symptoms. The sleep-related withdrawal symptom was the primary outcome measure in this study. For this symptom, respondents were asked, "Did you ever have trouble falling asleep or staying asleep when the effects of alcohol were wearing off?" Responses were recorded for past year and prior to the past year. In this study, lifetime alcohol-related insomnia was measured by an endorsement of insomnia in either timeframe (i.e., past year and prior to the past year).

Alcohol consumption—A series of alcohol consumption measures were included in this study. The primary measures included duration of period of heaviest drinking (measured in years), and the number of drinks of any alcohol usually consumed on drinking days during their period of heaviest drinking (number of standardized drinks). Two additional measures regarding the timing of drinking were included, although data for these were available only for the past 12 months. This included frequency of drinking before 3 pm (past 12 months) and frequency of drinking after midnight (past 12 months). Reliability analysis revealed high intraclass correlations for alcohol consumption measures.10 We reasoned that respondents with AWD-related insomnia would be more likely to drink after midnight when sleep disruption might be at its worst.

Diagnostic variables—Five categories of DSM-IV congruent lifetime diagnoses were included in this study, and scored as either present or not: non-nicotine drug use disorders (abuse or dependence of heroin, hallucinogens, cocaine/crack, marijuana, stimulants, painkillers, tranquilizers, sedatives, and volatile solvents); nicotine dependence; anxiety disorders (panic disorder with or without agoraphobia, agoraphobia without panic, social phobia, agoraphobia, generalized anxiety); major depressive disorder; and other mood disorders (bipolar disorder, dysthymia, cyclothymia).

Sociodemographics—Sociodemographic measures in this study included race (White, African American, and other), gender, and age. Family histories of alcohol problems were based on respondents' answers to questions assessing whether or not their blood or natural parents (father and/or mother) had ever "been an alcoholic or problem drinker."

Analytic Plan

Analyses were computed using SUDAAN Version 9.0.12 This system implements a Taylor series linearization to adjust standard errors of estimates for complex survey sampling design effects including clustered data. Chi-square tests were used to make bivariate comparisons among the various study variables with AWD-related insomnia. A step-wise multivariate logistic regression was used to examine the contribution of different sets of variables in the prediction of insomnia, including family history and sociodemographics (set 1), diagnostic variables (set 2), and alcohol consumption (set 3). Variables that were associated with insomnia at $p < .05$ were included in the multivariate analysis.

Results

Prevalence and Relative Prevalence of Withdrawal Symptoms

As previously reported, the lifetime prevalence for alcohol dependence was 12.5% (SE = 0.4),13 and 7.5% (SE = 0.2) met criteria for both alcohol dependence and alcohol withdrawal (i.e., they reported two or more withdrawal symptoms). At least one withdrawal symptom was reported by 87.7% (SE = 0.6) of alcohol-dependent adults. Two or more

withdrawal symptoms, required by DSM-IV to meet diagnostic criteria of alcohol withdrawal, were reported by 60.1% (SE = 0.8) of alcohol-dependent adults. Among respondents with lifetime alcohol dependence (with or without alcohol withdrawal), 31.7% (SE = 0.9) had AWD-related insomnia. Among those with alcohol withdrawal, 48.8% (SE = 1.2) had AWD-related insomnia. Therefore, about 50% of individuals who met criteria for alcohol withdrawal in the general population reported AWD-related insomnia.

Table 1 provides a summary of the relative prevalence of lifetime AWD symptoms among adults with a lifetime history of alcohol dependence. AWD-related insomnia (i.e., trouble falling/staying asleep) was the fourth most common withdrawal symptom of the eight symptoms assessed. It was less commonly reported than nausea (75.7%), feeling unusually restless (35.5%) and sweating or heart beating fast (33.8%), and more commonly reported than feeling anxious, shaking, hallucinations, and seizures.

Bivariate Associations with Insomnia

Chi-square tests were used to examine the associations between insomnia and the other study variables among persons with a lifetime history of alcohol dependence. In these analyses, eight of 14 variables were significantly associated with insomnia as a withdrawal symptom: family history of alcohol dependence, female gender, ages 35-54 yr, lifetime diagnoses of other drug use disorder (excluding nicotine); lifetime diagnoses of major depression and anxiety disorders; a later age of onset of alcohol dependence; and a longer duration of the heaviest drinking period (see Table 2). The usual number of drinks per day during the heaviest drinking period was not significantly associated with AWD-related insomnia. Nicotine dependence and time-of-day effects for drinking were also not significantly related.

Multivariate Associations with Insomnia

A logistic regression model was developed in three steps, using only significant variables from the bivariate analyses (see Table 3). In the first step, family history of alcohol problems and sociodemographics (i.e., age and sex) were entered into the model. Like the bivariate associations, having a family history of substance use problems, being 35-54 years of age, and being female were significant factors associated with insomnia as a withdrawal symptom. In the second step, co-occurring psychiatric diagnoses were added to the model. While a lifetime major depressive disorder and lifetime drug use disorder were associated with insomnia in this second step, lifetime anxiety disorder and sex were no longer significant.

In the third step of the model, alcohol consumption variables were included, after which none of the family history and sociodemographic variables were significant. Respondents with lifetime major depressive episode and lifetime drug use disorder were 38% and 26% more likely to report insomnia (respectively) compared to respondents without these conditions. Age of alcohol dependence onset was also significantly associated with insomnia. Specifically, respondents with an age of alcohol dependence onset from 18 to 20 and 21 to 27 years of age were approximately 30% and 26% less likely to report insomnia compared to those with an onset of 28 years or older (respectively). Those with the shortest duration of heaviest drinking (i.e., ≤ 1 year) were 25% less likely to report insomnia compared to those with the longest duration (i.e., 7+ years).

Discussion

The major finding in this study was that nearly one-third of individuals in the general population who met lifetime criteria for alcohol dependence reported insomnia as a

withdrawal symptom. This contrasts with an estimated rate of 58% in clinical populations. However, about 50% of individuals who met criteria for AWD in the general population reported insomnia as one of its symptoms. Among the eight criterion withdrawal symptoms listed in DSM-IV, insomnia ranked fourth behind nausea, restlessness, and autonomic symptoms (sweating or heart beating fast). Similarly, insomnia ranked third among 12 different withdrawal symptoms when calculated for a combined clinical sample of 1,193 patients.2

A family history of alcohol use disorders; female gender; middle age (35-54 years); non-nicotine lifetime drug use disorders; lifetime major depression and anxiety disorders; later age of onset (after 27 years old) for alcohol dependence; and 7 or more years of heavy drinking were associated with insomnia in bivariate analyses. Drinks per drinking day during the heaviest period of drinking and time of day of drinking in the past 12 months were not associated. In the multivariate analysis, which included all significant variables from the bivariate analyses, four variables remained as significant predictors of AWD-related insomnia. Lifetime diagnoses of major depressive episodes and drug use disorders (excluding nicotine) were associated with AWD-related insomnia, whereas onset of alcohol dependence between ages 18 and 27 as well as a one-year or less period of heaviest drinking were protective factors.

From a diagnostic perspective, insomnia was not included as a symptom criterion of AWD when DSM-III was published in 1980,14 but did appear in the 1987 publication of DSM-III-R15 and remains so in DSM-IV-TR.1 Similarly, despite its relatively high prevalence, insomnia is not included in the commonly and currently used AWD rating scale, the 10-item revised Clinical Institute Withdrawal Assessment scale for Alcohol (CIWA-Ar),16 nor its 15-item parent scale17 and derivatives.18،19 Another scale by DePetrillo & McDonough20 also omits sleep disturbances. AWD scales that do include sleep disturbances, such as the Selected Severity Assessment,21 its modified version – the Abstinence Symptom Evaluation Scale22 – and the Rating Scale for Assessment of Alcohol Withdrawal Psychopathology,6 are infrequently used in clinical practice.

AWD rating scales are generally designed to assess the severity of symptoms across multiple time points within a single day to determine when detoxification medications should be administered in order to prevent medical complications such as delirium tremens or seizures. In this respect, an insomnia item would not change within a single day and, therefore, not add value to the rating scale. Nevertheless, patients that do not sleep well during and recently after acute withdrawal may be at higher risk for relapse.3،8 Therefore, the presence of insomnia during withdrawal is very important for treatment purposes, even though it is not useful for guiding doses of medications for detoxification during the daytime.

Benzodiazepines, which are the evidence-based medications of choice for pharmacological detoxification during alcohol withdrawal,23،24 may also be administered at night for AWD-related insomnia according to the same protocol used for daytime symptoms. This common practice of treating AWD-related insomnia, however, may need to be reconsidered given mounting evidence that benzodiazepines are less effective than anticonvulsants such as gabapentin and carbamazepine for treating AWD-related insomnia8،25 and preventing relapse.8

Limitations of this study include the use of a single insomnia item related to alcohol withdrawal. Insomnia as either an independent symptom or diagnosis cannot be determined from the NESARC dataset. Another limitation is the potential bias of retrospective recall, which is inherent to all surveys that ask respondents to remember and report diagnostic

symptoms across a lifetime of drinking. The cross-sectional design of the study and the use of lifetime diagnoses do not permit the term, *predictor*, to be used except in a statistical sense when describing correlates of AWD-related insomnia. Nevertheless, the study is strengthened by its use of a representative national sample of adults with alcohol dependence, which provides a base rate against which to compare the widely variable rates of insomnia reported in clinical samples.

In conclusion, the relatively high prevalence of AWD-related insomnia in both the general and clinical populations, and its association with relapse in clinical samples, suggests that reliance of rating scales for alcohol withdrawal that do not include or characterize insomnia may be insufficient for both assessment and treatment purposes. The use of rating scales for, and targeted treatment of, AWD-related insomnia deserves consideration as a treatment guideline for alcohol-dependent patients.

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Table 1

Prevalence of Alcohol Withdrawal Symptoms among Adults with DSM-IV Lifetime Alcohol Dependence

	Lifetime History of Alcohol Dependence		
Withdrawal Symptom	**Total N†**	**Yes % (SE)**	**No % (SE)**
Nausea	4,776	75.7 (.79)	24.3 (.79)
Unusually restless	4,747	35.5 (.85)	64.5 (.85)
Sweat or heart beat fast	4,734	33.8 (.84)	66.2 (.84)
Trouble falling/staying asleep	4,756	31.7 (.89)	68.3 (.89)
Feel anxious or nervous	4.753	29.1 (.83)	70.9 (.83)
Shake	4,771	24.8 (.86)	75.2 (.86)
See, feel, hear things	4,754	10.2 (.61)	89.8 (.61)
Fits or seizures	4,769	2.8 (.31)	97.2 (.31)

Note: Total N refers to the total unweighted number of survey respondents with a lifetime history of alcohol dependence. All percentages (%) and standard errors (SE) are weighted estimates.

Table 2

Bivariate Associations between Trouble Falling/Staying Asleep and Demographic, Psychosocial and Clinical Measures among Adults with a Lifetime History of Alcohol Dependence

		Trouble falling/staying asleep	
Variable	**Categories**	**Yes (N = 1,499) % (SE)**	**χ^2 (df),**
Sex	Male	29.7 (1.2)	10.4 (1)**
	Female	35.8 (1.5)	
Age	18-25	26.4 (1.9)	31.2 (3)***
	26-34	28.9 (1.5)	
	35-54	37.0 (1.3)	
	55+	26.6 (1.9)	
Race	White	32.1 (1.0)	1.8 (2)
	African American	27.4 (2.4)	
	Other	31.7 (2.3)	
Family history of AUD	Yes	35.8 (1.3)	14.2 (1)***
	No	29.4 (1.2)	
Lifetime history of major depressive disorder	Yes	38.4 (1.5)	32.6 (1)***
	No	27.9 (1.1)	
Lifetime history of other mood disorder	Yes	29.8 (3.3)	.4 (1)
	No	31.8 (.9)	
Lifetime history of anxiety disorder	Yes	37.9 (1.9)	14.8 (1)***
	No	29.7 (.9)	
Lifetime drug use disorder (excluding nicotine)	Yes	36.1 (1.6)	14.0 (1)***
	No	28.8 (1.0)	
Lifetime history of nicotine dependence	Yes	33.0 (1.3)	2.3 (1)
	No	30.4 (1.1)	
No. drinks of any alcohol usually consumed during period of heaviest drinking	1-3	32.7 (1.9)	1.8 (3)
	4-5	33.3 (1.8)	
	6-10	30.4 (1.4)	
	11+	32.0 (2.1)	
Age of onset of alcohol dependence (in years)	<18	33.1 (2.0)	20.4 (3)***
	18-20	28.0 (1.6)	
	21-27	29.9 (1.5)	
	28+	37.8 (1.7)	
Duration of period of heaviest drinking (in years)	1	28.3 (1.4)	10.3 (3)*
	2-3	31.3 (1.6)	
	4-6	31.7 (1.9)	
	7+	36.3 (1.9)	
How often drank before 3pm in last 12 months	3-7 times weekly	35.7 (3.5)	5.79 (3)
	2-3 times monthly	31.0 (3.3)	
	Monthly or less†	31.8 (1.5)	

		Trouble falling/staying asleep	
Variable	**Categories**	**Yes (N = 1,499) % (SE)**	**χ^2 (df),**
How often drank after midnight in last 12 months	None	28.5 (1.2)	3.1 (3)
	3-7 times weekly	35.1 (3.4)	
	2-3 times monthly	32.6 (3.1)	
	Monthly or less†	30.2 (1.3)	
	None	29.4 (1.6)	

Note: Total N refers to the total unweighted number of survey respondents with a lifetime history of alcohol dependence.

†Monthly or less (but at least one time). All percentages (%) and standard errors (SE) represent weighted row estimates.

*p< .05

**p < .01

*p < .001.

Table 3

Multivariate Association Between Trouble Falling/Staying Asleep and Demographic, Psychosocial, and Clinical Variables Based on Logistic Regression Analysis.

	Step 1	Step 2	Step 3
Variables	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**
Age			
18-25	Ref	Ref	Ref
26-34	1.09 (.84 – 1.42)	1.08 (.83 – 1.41)	1.0 (.76- 1.31)
35-54	**1.62 (1.29-2.02)**	**1.57 (1.25 – 1.97)**	1.28 (.99-1.66)
55+	1.01 (.75 – 1.34)	1.06 (.79 – 1.43)	.81 (.58-1.12)
Sex			
Male	Ref	Ref	Ref
Female	**1.27 (1.06 – 1.52)**	1.17 (.97-1.42)	1.16 (.96-1.40)
Family history of alcohol problems			
Yes	**1.29 (1.10 – 1.50)**	**1.19 (1.01 – 1.40)**	1.16 (.99-1.37)
No	Ref	Ref	Ref
Lifetime Major Depressive Episode			
Yes	-	**1.37 (1.14 – 1.65)**	**1.38 (1.15-1.66)**
No		Ref	Ref
Lifetime Anxiety Disorder			
Yes	-	1.14 (.93 – 1.40)	.88 (.71-1.08)
No		Ref	Ref
Lifetime Drug Use Disorder (excluding nicotine)			
Yes	-	**1.26 (1.06 – 1.51)**	**1.26 (1.05-1.52)**
No		Ref	Ref
Age of onset categorized			
<18	-	-	.81 (.63-1.04)
18-20			**.70 (.56-.88)**
21-27			**.74 (.60-.92)**
28+			Ref
Duration (in years) of period of heaviest drinking			
1	-	-	**.75 (.59-.96)**
2-3			.84 (.67-1.06)
4-6			.88 (.69-1.12)
7+			Ref
Overall model fit Adjusted Wald F	54.37 ($p < .001$)	42.32 ($p < .001$)	24.85 ($p < .001$)

Note: AOR = Adjusted odds ratio; values in bold are statistically significant based on a 95% confidence interval that does not bound 1.0. CI = Confidence interval. Ref = Reference group.

† Monthly or less but at least once.