

Brief Report

Alcohol use and initial smoking lapses among heavy drinkers in smoking cessation treatment

Christopher W. Kahler, Ph.D., Nichea S. Spillane, Ph.D., & Jane Metrik Ph.D.

Center for Alcohol and Addiction Studies, Brown University, Providence, RI

Corresponding Author: Christopher W. Kahler, Ph.D., Center for Alcohol and Addiction Studies, Brown University, Box G-S121-5, Providence, RI 02912, USA. Telephone: 401-863-6651; Fax: 401-863-6697; E-mail: christopher_kahler@brown.edu

Received December 22, 2009; accepted April 28, 2010

Abstract

Introduction: This study examined alcohol use and its association with initial smoking lapses among heavy nondependent drinkers in smoking cessation treatment.

Methods: Participants were 236 heavy drinking smokers in a randomized clinical trial testing the efficacy of incorporating brief alcohol intervention into smoking cessation treatment.

Results: Of the 178 participants who reported a smoking lapse, 41.5% lapsed when drinking alcohol. Those who had alcohol-involved lapses had significantly lower tobacco dependence severity and drank more drinks per week than those who had non-alcohol-involved lapses. The majority of alcohol-involved lapses were in a bar/restaurant, with other people, and when they were in a happy/good mood. In survival analyses with alcohol consumption as a time-varying covariate, moderate drinking days were associated with almost four times greater risk of smoking lapse than non-drinking days, and heavy drinking doubled the risk of lapsing compared with moderate drinking.

Discussion: Results suggest that alcohol-related lapses are qualitatively different from lapses that do not involve alcohol. Furthermore, among heavy drinkers in cessation treatment, even moderate alcohol use is associated with increased risk of smoking, with heavy drinking further increasing the risk. Smoking cessation treatments for heavy alcohol drinkers should highlight the lapse risk associated with any alcohol consumption and with heavy drinking during a quit smoking attempt.

Introduction

Cigarette smokers drink alcohol more heavily than nonsmokers (Anthony & Echeagaray-Wagner, 2000; Chiolero, Wietlisbach, Ruffieux, Paccaud, & Cornuz, 2006; Dawson, 2000; Falk, Yi, & Hiller-Sturmhofel, 2006; Kahler, Strong, et al., 2008), and greater alcohol use is associated with decreased odds of smoking cessation (Augustson et al., 2008; Dollar, Homish, Kozlowski, &

Leonard, 2009; Garvey, Bliss, Hitchcock, Heinold, & Rosner, 1992; Hymowitz et al., 1997; Osler, Prescott, Godtfredsen, Hein, & Schnohr, 1999; Sorlie & Kannel, 1990) with frequency of heavy drinking (4+ drinks for women and 5+ drinks for men), rather than frequency of drinking or average weekly quantity of consumption, being most strongly associated with low cessation rates (Dawson; Kahler et al., 2009). Current alcohol use (Humfleet, Munoz, Sees, Reus, & Hall, 1999; Sherman, Wang, & Nguyen, 1996; Smith, Kraemer, Miller, Debusk, & Taylor, 1999) and heavy drinking (Leeman et al., 2008; Murray, Istvan, Voelker, Rigdon, & Wallace, 1995) at the start of smoking treatment and use of alcohol following treatment (Humfleet et al.) are negatively associated with abstinence, although there has been an exception (Hughes & Oliveto, 1993).

In smoking treatment samples, approximately one quarter of initial smoking lapses (first instance of smoking after making a quit attempt) occurs in contexts involving alcohol use (Baer & Lichtenstein, 1988; Borland, 1990; Shiffman, 1982). Data from ecological momentary assessment have shown that alcohol use is more likely to be reported immediately before lapses compared with random prompt situations (Gwaltney, Shiffman, & Sayette, 2005; Shiffman & Gwaltney, 2008; Shiffman, Paty, Gnys, Kassel, & Hickcos, 1996). However, these studies have not examined whether heavy drinking increases the risk of a smoking lapse compared with moderate drinking nor do they indicate directly the extent to which a drinking day is associated with greater risk of lapsing than a non-drinking day. Recently, Leeman et al. (2008) reported that the proportion of days in which smoking occurred after a smoking quit date was significantly higher on heavy drinking days compared with moderate and non-drinking days. However, these analyses pooled data over time rather than examining alcohol use as a time-varying predictor of smoking lapse. Thus, the extent to which moderate and heavy drinking days are associated with increased risk for an initial smoking lapse relative to non-drinking days has not been fully quantified nor have individual differences in these associations been examined. Such information is critical to efforts to counsel alcohol drinkers in smoking treatment on the potential benefits of avoiding drinking and moderating heavy drinking.

doi: 10.1093/ntr/ntq083

Advance Access published on May 27, 2010

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The objective of the present study was to quantify the risks associated with moderate and heavy drinking days compared with non-drinking days, among nondependent heavy drinkers in smoking cessation treatment. We also examined whether these risks were moderated by relevant individual differences including gender, tobacco dependence, and baseline drinking and whether smoking cessation treatment that explicitly addresses alcohol use as a relapse risk factor would reduce the risk of smoking lapses on drinking days.

Method

Participants

Participants were 236 community-based heavy drinking smokers seeking cessation treatment in a randomized clinical trial comparing standard smoking cessation treatment (ST) with smoking cessation treatment that incorporates a brief alcohol intervention (ST-BI; Kahler, Metrik, et al., 2008). To be included, participants had to be at least 18 years old, smoke at least 10 cigarettes/day, use no other tobacco products or nicotine replacement therapy, and drink heavily according to National Institute on Alcohol Abuse and Alcoholism guidelines (National Institute on Alcohol Abuse and Alcoholism, 1995). Participants were excluded if they met *DSM-IV* criteria for current substance abuse or dependence (excluding nicotine dependence and alcohol abuse), had a current affective disorder or were psychotic or suicidal, had an unstable medical condition contraindicated for the use of the nicotine patch, or were currently pregnant or lactating or intended to become pregnant. The sample was 45% female, 90.7% non-Hispanic White, and 33% married. The mean age was 41.5 ($SD = 12.0$) years, and mean education was 14.0 ($SD = 2.6$) years. At baseline, participants smoked 21.3 ($SD = 9.4$) cigarettes/day, and the mean on the Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991) score was 5.0 ($SD = 2.2$). Participants reported drinking on 54.7% ($SD = 27.3$) of possible days and consuming 16.5 ($SD = 11.9$) drinks per week.

Procedure

Treatment consisted of four weekly individual counseling sessions with quit date occurring at Session 2. ST-BI incorporated focused discussion of participant's alcohol use, including feedback on the risk of smoking relapse associated with drinking and goal setting regarding drinking during smoking cessation. All participants received transdermal nicotine patch (21 mg for 4 weeks, 14 mg for the 2 weeks, and 7 mg during the last 2 weeks). Follow-ups were conducted at 8, 16, and 26 weeks after quit date.

Measures

The calendar-assisted timeline followback (TLFB) interview (Sobell & Sobell, 1996) was used at baseline and follow-up to assess alcohol and cigarette use. Participants reported number of cigarettes smoked and number of alcoholic drinks consumed on each day since the last interview. The timing of alcohol use relative to smoking was not assessed. The TLFB has been validated for retrospective reports of up to 24 months.

Seven-day point prevalence abstinence was assessed at 2, 8, 16, and 26 weeks after quit date. Self-reported abstinence was

verified by alveolar carbon monoxide (CO) at all timepoints and by cotinine analysis of saliva samples at 16- and 26-week follow-ups. Abstinence was verified by a combination of $CO \leq 10$ ppm and cotinine ≤ 15 ng/ml (SRNT Subcommittee on Biochemical Verification, 2002).

When a smoking lapse was first reported, a lapse interview was administered to participants to determine the circumstances surrounding the initial lapse, including whether they were drinking alcohol at the time, who else was present and whether they were smoking, location of the lapse, activity engaged in at time of lapse, and feelings just before lighting the cigarette.

Data analysis plan

We examined lapse interview data using chi-squares and t tests to characterize alcohol-involved smoking lapses in comparison with smoking lapses that did not involve alcohol. We then examined TLFB data to characterize drinking on a lapse day. We next conducted discrete-time survival analysis using Cox proportional hazards regression models to test the hypothesis that the risk of an initial smoking lapse was significantly higher on days when drinking occurred compared with non-drinking days. In the first model, we included the following predictors: gender, FTND, average drinks per week at baseline (square-root transformed to correct positive skewness), and treatment condition. In the second, we added drinking status as a dichotomous time-varying covariate. In the third model, we added interactions between time-varying drinking status and gender, FTND, treatment condition, and time to examine moderators of the effect of drinking on smoking lapse risk. Finally, we conducted analyses that compared moderate drinking (1–4 drinks for men and 1–3 drinks for women) days with non-drinking days and to heavy drinking (5+ drinks for men and 4+ drinks for women) days.

Results

Overall, 184 (78.0%) participants reported a lapse to smoking in the 26 weeks after quit date, of whom 178 completed the lapse interview. The median number of days from lapse to the interview was 7 with a wide range (0–162). Of those lapsing, 41.5% reported that they were drinking at the time. Compared with lapses not involving alcohol, alcohol-involved lapses were more likely to occur when friends were present, when eating, at restaurants/bars, at social functions, and when experiencing positive mood (see Table 1). They occurred less often at work, with coworkers, and when experiencing negative moods and withdrawal symptoms. Number of days to smoking lapse did not differ significantly by lapse type.

TLFB data were available on 216 participants. However, six of these reported no smoking on the TLFB but had smoking abstinence disconfirmed biochemically at at least one follow-up. These six participants were dropped from analyses using TLFB data. Of the 210 remaining participants, 179 reported a smoking lapse on the TLFB; 18 (10.1%) of these participants lapsed on the set quit date. Of those lapsing, 67.0% reported drinking on the same day (not necessarily at the same time) as the smoking lapse with 30.2% reporting heavy drinking. That level of drinking was substantially higher than the drinking that occurred on the day immediately before the lapse, on

Table 1. Comparisons of non-alcohol-involved and alcohol-involved smoking lapses

Variable	Non-alcohol-involved lapse (<i>n</i> = 104)		Alcohol-involved lapse (<i>n</i> = 74)		Effect size
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>d</i>
Age (years)	40.6	10.7	40.6	11.7	0.00
Average drinks per week at baseline	14.7	11.0	18.3	11.0	0.32*
FTND	5.4	2.0	4.3	2.3	-0.54***
Days from quit date to lapse	21.4	31.6	33.0	42.9	0.30 ^a
	<i>n</i>	%	<i>n</i>	%	<i>h</i>
Gender					
Men	50	48.1	44	59.5	0.23
Women	54	51.9	30	40.5	
Treatment condition					
ST	50	48.1	39	52.7	0.09
ST-BI	54	51.9	35	47.3	
Location of slip					
Home	56	53.8	17	23.0	-0.64***
Work	16	15.4	2	2.7	-0.48**
Bar/restaurant	3	2.9	29	39.2	1.01***
Other's home	9	8.7	19	25.7	0.47**
Other	20	19.2	7	9.5	-0.28
Others smoking	43	42.6	61	83.6	0.88***
Family present	19	18.3	15	20.3	0.05
Coworkers present	15	14.4	3	4.1	-0.37*
Friends present	25	24.0	48	64.9	0.85***
Alone	46	44.2	15	20.3	-0.52***
Eating when slipped	0	0.0	13	17.6	0.87***
Relaxing when slip occurred	35	33.6	36	48.6	0.31*
Working when slip occurred	16	15.4	1	1.4	-0.57**
At social function when slip occurred	5	4.8	29	39.2	0.91***
Depressed mood	24	23.1	5	6.8	-0.47**
Irritable/angry	35	33.7	8	10.8	-0.57***
Anxious/tense	56	53.9	23	31.1	-0.47**
Problems concentrating	19	18.3	2	2.7	-0.55**
Restless/impatient	52	50.0	17	23.0	-0.57***
Hungry	9	8.6	5	6.8	-0.07
Happy/good	27	26.0	45	60.8	0.72***

Note. Lapse characteristics are not mutually exclusive (e.g., participants could report drinking and being with friends and being in a positive mood). Each participant reported only on their initial lapse to smoking after quit date. FTND = Fagerström Test for Nicotine Dependence; ST = standard smoking cessation treatment; ST-BI = standard smoking cessation treatment that incorporates a brief alcohol intervention.

^aDue to high skew and kurtosis, variable was square-root transformed prior to analysis. Effect size is based on transformed data.

* $p < .05$; ** $p < .01$; *** $p < .001$.

which only 33.3% reported drinking and 8.7% reported heavy drinking.

Survival to first smoking lapse

In the initial model examining day to first smoking lapse using TLFB data ($n = 210$), the main effects of gender, FTND, baseline drinks per week, and treatment condition were nonsignificant. In the second model, drinking status was entered as a time-varying covariate and was significant, $B = 1.62$, $SE = 0.17$, hazards ratio (HR) = 5.08, $p < .0001$, indicating that the risk of lapsing on a day when drinking occurred was over five times greater than the risk of lapsing on a day when no drinking occurred. In the third model, interactions between time-varying drinking status and gender, FTND, treatment condition, and time were added and were all nonsignificant. In the final model, time-varying drink-

ing status was dummy coded to compare moderate drinking with nondrinking and with heavy drinking. Moderate drinking was associated with almost four times greater risk of a smoking lapse than nondrinking, $B = 1.37$, $SE = 0.18$, $HR = 3.97$, $p < .0001$. Heavy drinking was associated with more than double the risk of lapsing compared with moderate drinking, $B = 0.76$, $SE = 0.19$, $HR = 2.15$, $p < .0001$ and more than eight times greater risk compared with nondrinking, $B = 2.14$, $SE = 0.20$, $HR = 8.52$, $p < .0001$.

Discussion

Among nondependent heavy drinkers receiving cessation treatment, smoking lapse episodes involved alcohol use more

than 40% of the time. Compared with lapses in which drinking was not involved, alcohol-involved lapses more often occurred among smokers with lower levels of tobacco dependence and during situations involving positive moods and others smoking, consistent with prior research with smokers not selected for heavy drinking (Borland, 1990; Shiffman, 1986; Shiffman et al., 1997). Alcohol-involved lapses more often occurred when participants were at social functions, outside their home, eating, and with friends and less often occurred with coworkers and when experiencing negative moods. Finally, greater drinking at baseline was associated with greater odds of having an alcohol-involved lapse. Thus, alcohol-involved smoking lapses are a distinct type of lapse episode, which are particularly likely among heavier drinkers. Knowing the characteristics of alcohol-involved lapses should help clinicians prepare heavy drinking smokers for situations that fit this lapse episode profile; unfortunately, the alcohol-focused smoking cessation intervention tested with this sample was not effective in reducing the proportion of lapse episodes involving drinking (Kahler, Metrik et al., 2008).

Discrete-time survival analyses with time-varying covariates indicated that the risk of an initial lapse to smoking was five times greater on drinking versus non-drinking days and was two times higher on heavy drinking versus moderate drinking days. Treatment condition, gender, level of tobacco dependence, and time did not alter the risk associated with alcohol use. These results suggest a strong relationship between drinking and initial smoking lapses that is consistent across gender and level of tobacco dependence, remains steady over time, and is not readily modifiable by an alcohol-focused smoking cessation treatment.

Limitations

The primary limitation of the study was that reports of smoking lapse characteristics and the TLFB interview were retrospective. Ecological momentary assessment would provide a more proximal assessment of the context of alcohol-involved smoking lapses and more fine-grained data on how much drinking occurred prior to a smoking lapse.

Conclusions

Among heavy drinkers in cessation treatment, any alcohol use on a given day is associated with greatly increased risk of a smoking lapse. The extent to which this risk reflects direct effects of drinking versus the contexts in which drinking typically occurs is an important area for future study. Greater understanding of how heavy drinking increases the risk of a lapse relative to moderate drinking also is needed and could ultimately inform efforts to develop treatments for the substantial portion of smokers who drink heavily.

Funding

This work was supported by the National Institute on Drug Abuse, grant R01 DA15534 to CWK.

Declaration of Interests

None declared.

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