Predictors of reduced smoking quantity among recovering alcohol dependent men in a smoking cessation trial

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HIGHLIGHTS

- Smokers with alcohol dependence have extremely low rates of smoking cessation.
- We examined baseline predictors of reductions in smoking among alcohol-dependent smokers in early sobriety from drinking.
- Less severe alcohol-related problems, depression severity, and impulsivity predicted greater reductions in smoking.
- Greater nicotine dependence, motivation to quit, and intrinsic reasons to quit predicted greater reductions in smoking.
- Predictors of reduced smoking could potentially be used to personalize treatment.

ARTICLE INFO

ABSTRACT

Introduction: Adults with alcohol dependence (AD) have exceptionally high smoking rates and poor smoking cessation outcomes. Discovery of factors that predict reduced smoking among AD smokers may help improve treatment. This study examined baseline predictors of smoking quantity among AD smokers in a pharmacotherapy trial for smoking cessation.

Methods: The sample includes male, AD smokers ($N = 129$) with 1–32 months of alcohol abstinence who participated in a 12-week trial of medication (topiramate vs. placebo) and adjunct counseling with 6 months of follow-up. Baseline measures of nicotine dependence, AD severity, psychopathology, motivation to quit smoking, and smoking-related cognitions were used to predict smoking quantity (cigarettes per day) at post-treatment and follow-up.

Results: Overall, the sample had statistically significant reductions in smoking quantity. Greater nicotine dependence (Incidence rate ratios ($IRRs$) = 0.82–0.90), motivation to quit ($IRRs$ = 0.65–0.85), and intrinsic reasons for quitting ($IRRs$ = 0.96–0.98) predicted fewer cigarettes/day. Conversely, greater lifetime AD severity (IRR = 1.02), depression severity ($IRRs$ = 1.05–1.07), impulsivity ($IRRs$ = 1.01–1.03), weight-control expectancies ($IRRs$ = 1.10–1.15), and childhood sexual abuse ($IRRs$ = 1.03–1.07) predicted more cigarettes/day.

Conclusions: Smokers with AD can achieve large reductions in smoking quantity during treatment, and factors that predict smoking outcomes in the general population also predict greater smoking reductions in AD smokers. Treatment providers can use severity of nicotine dependence and AD, motivation to quit, smoking-related cognitions, and severity of depression to guide treatment and improve outcomes among AD smokers.

1. Introduction

Cigarette smoking remains a significant and prevalent public health problem contributing to cancer, cardiovascular and respiratory disease, and premature mortality (Services, 2014). Rates of smoking cessation are low (Stead et al., 2012) and smokers with a substance use disorder have even worse rates of cessation (Prochaska, Delucchi, & Hall, 2004). Many alcohol-dependent (AD) smokers continue to smoke during abstinence from drinking, which contributes to chronic, costly health problems (John & Hanke, 2002). Smoking cessation treatments for this population need to be improved. Greater understanding of the factors that contribute to reduced smoking in this population may help

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advance treatment.

Severity of either nicotine dependence or AD may predict smoking outcomes in this special population. Among smokers without AD, those with less severe nicotine dependence typically have greater quit rates (Caponnetto & Polosa, 2008; Carlson, Taenzer, Koopmans, & Bultz, 2000; Dale et al., 2001; Murray et al., 2000). Severity of AD may also predict smoking outcomes, as lower levels of drinking and alcohol-related problems have predicted better smoking cessation in smokers without AD (Augustson et al., 2008; Hughes & Kalman, 2006; Hyland et al., 2004; Osler, Prescott, Godtfredsen, Hein, & Schnohr, 1999). Among smokers with alcohol or substance use disorders, severity of nicotine dependence has predicted smoking cessation in some studies (Rohsenow et al., 2015) but not others (Rohsenow, Martin, Tidey, Monti, & Colby, 2013), as discussed in a prior review (Heffner, Barrett, & Anthenelli, 2007). Prior research has not examined the role of AD severity in predicting reduced smoking within the population of AD smokers.

Other factors that may predict smoking outcomes include measures of co-occurring psychopathology, which tends to be more severe in AD smokers as compared to others (Heffner, Mingione, Blom, & Anthenelli, 2011). Among non-AD smokers, greater severity of depression or anxiety has predicted poorer smoking cessation outcomes (Cinciripini et al., 1995; Weinberger, Mazure, Morlett, & McKee, 2013). Traumatic life experiences, which are prevalent among substance users (Heffernan et al., 2000), also relate to worse smoking outcomes, with sexual abuse associated with propensity for nicotine dependence and lower quit rates (King, Guilbert, Ward, Arwidson, & Noubary, 2006; Smith et al., 2015; Smith, Homish, Saddleson, Kozlowski, & Giovino, 2013). Greater impulsivity (a tendency to act quickly without careful thought) has been linked to both nicotine and alcohol dependence (Chase & Hogarth, 2011; Rubio et al., 2008), and greater impulsivity has predicted poorer smoking treatment outcomes (Loree, Lundahl, & Ledgerwood, 2015). These factors related to impaired psychological functioning are potentially important predictors of smoking outcomes in smokers with AD, as they typically have greater depression, anxiety, and impulsivity than other smokers (Lawrence, Mitrou, & Zubrick, 2009; VanderVeen, Cohen, & Watson, 2013).

Smoking-related motivations and cognitions have also predicted smoking treatment outcomes in non-AD smokers and could predict reduced smoking in AD smokers. Baseline motivation to quit often predicts smoking cessation (Boardman, Catley, Mayo, & Ahluwalia, 2005; Piñeiro et al., 2016). Higher levels of relative intrinsic (vs. extrinsic) reasons for quitting have also predicted greater rates of smoking cessation (Curry, Grothaus, & McBride, 1997). Other predictive cognitive factors include expectancies about the consequences of smoking or quitting smoking (Copeland, Brandon, & Quinn, 1995). Beliefs about use of cigarettes to regulate mood and weight have been associated with smoking intensity or treatment outcomes (Hruska et al., 2014; Weinberger, McKee, & George, 2010). Lower motivation to quit, fewer internal reasons for quitting, and stronger beliefs about the positive aspects of smoking may very well predict poorer smoking outcomes in AD smokers, although some prior studies have not found these effects (Rohsenow, Tidey, Kahler, et al., 2015).

The goal of this study was to identify baseline characteristics that predict smoking outcomes in AD smokers with recent alcohol abstinence who received treatment for smoking cessation. Weekly smoking outcomes were assessed at treatment endpoint (weeks 9–12), middle follow-up (weeks 21–24), and late follow-up (weeks 33–36). To date, no single study of AD smokers has examined a broad range of relevant predictors, including nicotine and alcohol dependence, co-occurring psychopathology, and smoking-related motivations and cognitions. Consistent with the typical low rates of cessation in this population (Prochaska et al., 2004), only 9.3% of the sample in this trial quit smoking throughout the final month of treatment (Anthenelli et al., 2017). Therefore, the current study examined reductions in smoking quantity. Reduced smoking is associated with future cessation (Hyland

et al., 2005; Klemperer & Hughes, 2015) and although the evidence is mixed, reductions in smoking are also associated with health benefits in some studies (Begh, Lindson-Hawley, & Aveyard, 2015; Gerber, Myers, & Goldbourt, 2012). In this population, reduced smoking quantity represents a meaningful intermediate target, with findings having the potential to improve treatment delivery. We hypothesized that lower severity of nicotine dependence, AD, depression, anxiety, impulsivity, smoking reinforcement expectancies, and childhood sexual abuse would predict greater reductions in weekly smoking quantity, while greater motivation to quit smoking would predict greater reductions in smoking at the end of treatment and follow-ups.

2. Materials and methods

2.1. Study design

This secondary analysis study examined data from a randomized, controlled trial of topiramate (100 mg twice daily) vs. placebo for smoking cessation and alcohol relapse prevention, with adjunct brief counseling in both conditions. The study included nicotine-dependent male smokers with alcohol dependence who were currently abstinent from drinking. The decision to include only male smokers was based on our earlier study that found gender-specific effects of topiramate on smoking cessation (Anthenelli, Blom, McElroy, & Keck Jr., 2008). Study duration was 36 weeks, with 12 weeks of active treatment and 24 weeks of follow-up. With details on primary trial outcomes and study design reported previously in greater detail (Anthenelli et al., 2017), study methods are summarized briefly here.

2.2. Subjects

Study participants were 18–70 years of age, male, had DSM IV-TR current nicotine dependence, smoked an average of at least 10 cigarettes per day in the previous two months, had 1–36 months of abstinence from alcohol, and reported at least moderate motivation to quit smoking (≥ 6 on a 1–10 scale). Exclusion criteria included recent (past-month) receipt of smoking cessation treatment, alcohol pharmacotherapies, or any investigational drug, as well as a current seizure disorder or history of severe alcohol withdrawal, elevated suicidal risk, history of a psychotic disorder, known hypersensitivity to topiramate, or any clinically significant laboratory abnormalities or medical problems. From the full randomized sample ($N = 133$) the present study examined a modified intent-to-treat sample ($N = 129$) restricted to participants from both treatment conditions who took at least one dose of study medication. Due to some missing data on baseline measures, the available sample size ranged from 107 to 126 across the specific analyses. Veterans comprised the majority of the sample (62%), with a substantial proportion of non-white participants (43.7%). Demographic and clinical characteristics of the sample are described in Table 1.

2.3. Measures

2.3.1. Cigarette smoking

The Timeline Follow Back (Gariti, Alterman, Ehrman, & Pettinati, 1998) completed at baseline (past 90 days), weekly during treatment, and monthly during follow-up assessed daily smoking quantity (cigarettes/day), which did not differ significantly between treatment conditions (Isgro et al., 2017). For the smoking outcome variables, daily data were used to obtain a measure average cigarettes/day in the past week for three key periods of study involvement: treatment endpoint (Weeks 9–12), middle follow-up (Weeks 21–24) and late follow-up (Weeks 33–36). Baseline smoking (past-month cigarettes/day) was also used as a covariate in analyses.

2.3.2. Demographics

Demographic characteristics were derived from the Semi-Structured