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Cigarette Smoking Among Opioid-Dependent Clients in a Therapeutic Community

JongSerl Chun, Ph.D. [Assistant Professor],

Graduate School of Social Welfare, Ewha Womans University, Seoul, South Korea

Nancy A. Haug, Ph.D. [licensed clinical psychologist and former Assistant Adjunct Professor],

Department of Psychiatry, University of California, San Francisco.

Joseph R. Gudyish, Ph.D. [Professor of Medicine],

Philip R. Lee Institute for Health Policy Studies, University of California, San Francisco.

James L. Sorensen, Ph.D. [Professor of Psychiatry], and

University of California, San Francisco, San Francisco General Hospital

Kevin Delucchi, Ph.D. [Professor of Psychiatry]

University of California, San Francisco

Abstract

This study examines smoking behavior in a sample of 231 opioid-dependent clients entering therapeutic community treatment, and investigates the relationship between smoking behavior and drug treatment outcomes. We applied regression analyses for selected Addiction Severity Index composites (alcohol, drug, medical, psychiatric), including factors for smoking (number of cigarettes per day, expired-air carbon monoxide level, nicotine dependence), time (baseline, 6 and 12-month), and smoking-by-time interaction. This study confirmed a high smoking prevalence (95%) among opioid users. Among participants interviewed at all time points (n=206), 13% shifted from smoking to non-smoking status at some time after admission. Participants who reported a greater number of cigarettes were more likely to report higher drug severity at any time point.

Keywords

smoking; opioid-dependent clients; drug treatment

INTRODUCTION

The prevalence of smoking among clients in community drug abuse treatment programs is three to four times that of the general population¹ and smoking-related diseases are a leading cause of death among individuals with substance abuse problems.² Drug abuse treatment programs, however, typically do not target smoking due to the beliefs that cigarette smoking is a lower treatment priority, and that smoking cessation efforts could jeopardize drug and alcohol treatment, and that clients are not interested in quitting.³

Many individuals in treatment are interested in quitting smoking as a part of recovery.⁴ Learning to quit smoking may positively influence drug and alcohol problems by providing

effective skills and techniques for cessation as well as a sense of mastery.⁵ Longer-term treatment clients, such as methadone maintenance patients who develop improved lifestyles due to less illicit opiate use, may be well suited for smoking cessation treatment.⁶ Patients in residential drug treatment may be motivated to quit smoking, and a stay in residential treatment may be a good time to quit.⁷ Kohn, Tsoh, & Weisner⁸ examined the impact of change in smoking behavior on 12-month drug treatment outcomes among HMO participants seeking drug treatment. They found that 13 % of the sample quit smoking and those who quit smoking or who were non-smokers had more days abstinent from alcohol and drugs compared to those who started, resumed, or continued smoking. This is consistent with Friend & Pagano⁹ who reported that Project Match participants who reduced tobacco use had better alcohol treatment outcomes. While a few studies have explored smoking in residential drug treatment settings,¹⁰ we found only one study that examined smoking specifically in a therapeutic community (TC) setting.¹¹ McDonald et al.¹¹ implemented a tobacco education and cessation program in an adolescent TC setting. They studied impacts of the program partly by examining smoking behavior and interest in quitting in a group of adolescents (n=55) at the time of admission and again at discharge from the program. At admission, 93% were current smokers, and 61% were interested in quitting smoking. At discharge, after exposure to the tobacco education program, 16% of smokers had quit smoking and 87% were interested in quitting.

While elevated smoking prevalence is reported for individuals enrolled in all types of drug treatment, the highest smoking prevalences (85–98%) have been reported in methadone maintenance.^{5, 12} Richter and Ahluwalia¹³ speculated that, in this population, the stimulant properties of nicotine may be used to offset the sedating effects of methadone. Previous studies demonstrate that opioid use increases smoking behavior.¹⁴ Haas et al.¹⁵ examined smoking behaviors among 126 opioid using patients who presented for non-psychiatric medical services at San Francisco General Hospital but not enrolled in substance abuse treatment. They found that smoking prevalence was 92% at baseline and 2 patients reported quitting smoking at a one-year follow-up. Out of treatment opioid users are a high risk group for continued smoking. In a study of U.S. outpatient methadone clinics, only one in ten of the responding facilities offered patients a full set of recommended smoking cessation services.⁸ In a study of methadone maintenance in Baltimore, 92% were current smokers.⁵ Study participants reported an average of 2.6 (*SD*=5.0) prior attempts at quitting, 21% reported prior use of either nicotine patches or nicotine gum, and only 5% had participated in a formal smoking cessation program. About 57% were interested in quitting, and 73% said that they planned to quit within 6 months.

This study examined smoking behavior, over 12 months, in 231 opioid-dependent clients entering TC treatment. We anticipated that opioid users entering a TC setting would have smoking prevalence similar to that reported for opioid users enrolled in methadone maintenance. We analyzed relationships between smoking measures and drug treatment outcome measures to investigate how smoking may relate to drug abuse treatment outcomes.

METHODS

Participants

This study used data from a larger project designed to examine the effectiveness of opioid replacement therapy (ORT) for clients in a residential TC. The parent study used a two-group longitudinal design to compare treatment outcomes for participants with a history of opioid use. All participants were (1) adults 18 years of age or older; (2) qualified for methadone maintenance treatment; and (3) screened for study participation within seven days of entry into the TC. The two study groups reflected whether participants were (n=125) or were not (n=106) receiving ORT at admission, and outcomes were compared between these two groups.¹⁶

Data Collection Procedures and Measures

Research interviews were conducted at baseline and at 6 and 12-month follow-ups. The Computerized Diagnostic Interview Schedule-IV (CDIS-IV) was administered at admission only, while the Addiction Severity Index (ASI)¹⁷ was administered at all three time points. A Micro III Smokerlyzer Breath CO Monitor (Bedfont Scientific Ltd.) was used to measure expired-air carbon monoxide (CO) at baseline, 6 and 12-month follow-ups. All study procedures were approved by the Institutional Review Board at the University of California, San Francisco.

The CDIS-IV¹⁸ is a structured interview based on the Diagnostic and Statistical Manual of Mental Disorders.¹⁹ In the present study, the nicotine dependence module was used to assess current smoking (Y/N), number of cigarettes per day, nicotine dependence (Y/N), and nicotine withdrawal (Y/N). Participant quit data was not reported. However, the quit rate at the follow-up interviews was measured using the current smoking status. Expired-air CO samples were obtained using a Micro III Smokerlyzer Breath CO Monitor which provides a digital readout of CO parts per million (ppm). Point-prevalent abstinence from smoking was defined as no smoking reported in the previous 7 days and an expired air carbon monoxide level of < 7 ppm.

The ASI is a commonly used tool for screening clients, assessing treatment needs, and predicting outcomes in clinical and research settings. ASI composite scores measure problem severity for the past 30 days in each of seven areas: alcohol use, drug use, employment, legal, medical, psychiatric status, and family-social functioning.¹⁷ Composite scores, ranging from 0 to 1, are derived from questions in each area.²⁰ The current report focuses on the alcohol, drug, medical and psychiatric composites since they have the most relevance to smoking behavior.

Data Analysis

ANOVA was used to examine smoking behavior over time, including current smoking, number of cigarettes per day, CO-level, and nicotine dependence. To assess the effects of smoking behaviors on drug treatment outcomes, we applied a linear regression model with bootstrapped standard errors for each ASI composite score (alcohol, drug, medical, psychiatric), including factors for smoking behaviors (number of cigarettes per day, CO-level, nicotine dependence), time (admission, 6 and 12-month follow-ups), and smoking by time interaction. These models controlled for age, gender, education, race/ethnicity, and use of methadone at admission. Time was treated as a linear effect. We applied bootstrapping procedures,²¹ which have been recommended for use with ASI composite scores because they sometimes have a high proportion of zero values.²² Linear regression models using the maximum likelihood approach were applied to all available data. There was no imputation of missing values in these analyses.

RESULTS

At treatment admission, participants had a mean age of 40 years ($SD = 9.8$). Approximately 37% were women and most (70%) had completed high school. About half were Caucasian and the remainder included African Americans (31%), Latinos (8%), or individuals of other ethnicities (11%). More than half (57%) had received methadone treatment in the 30 days preceding baseline. Over 60% reported heroin as the primary drug of choice and 24% reported polydrug use. At baseline, 53% met criteria for nicotine dependence using the CDIS-IV, and 30% showed nicotine withdrawal symptoms. The methadone and non-methadone groups were compared at baseline on age, gender, ethnicity, education, marital status, occupation, income, living situation and psychiatric and criminal justice measures. They differed only on living situation such that Methadone participants were more likely to be homeless in the past 30 days

whereas non-methadone participants were more likely to have been living in an institution in the past 30 days.¹⁶

Smoking Behavior Over Time

Current smoking prevalence decreased over time, from 95% at baseline, to 85% at 6-months and 88% at 12-months ($\chi^2 [2] = 12.02, p < .05$). At all time points, smokers consumed an average of 11 cigarettes per day ($F [2] = 0.24, p > .05$). The CO-level among all participants (13.4 at baseline, 12.6 at 6 months, and 13.0 at the 12-months) did not significantly change across time ($F [2] = 0.57, p > .05$).

Among 231 participants, smoking status was not reported for 25 participants on at least one follow-up point. For the subgroup of participants who were assessed at all three time points ($n = 206$), 82% identified as smokers at all three time points, and 1% reported initiating smoking after the baseline interview. Only 5% were consistent non-smokers and 13% stopped smoking at some time after admission ($n = 26$). Among 26 quitters, 13 participants stopped smoking at 6 months and restarted smoking at 12 months.

Relationship between Smoking Behavior and Drug Treatment Outcome Measures

All participants ($n=231$) were included in the final regression analyses. Analyses of ASI outcome measures showed that number of cigarettes per day at baseline was significantly related to ASI drug composite scores (see Table 2), such that participants who reported a greater number of cigarettes per day at baseline were more likely to show severe drug problems on an average time point over 12 months ($p < .05$). A time effect was observed reflecting increased psychiatric problems over time for all participants ($p < .05$).

A significant interaction was found for number of cigarettes-by-time, for the ASI drug composite ($p < .05$), so that the rate of change in drug problem severity over time differed significantly according to the number of cigarettes per day at baseline. Participants were classified into three groups using the baseline number of cigarettes per day (25th percentile, less than 6 cigarettes per day; 50th percentile, 6 to 13 cigarettes; 75th percentile, more than 13 cigarettes). At baseline, participants reporting a higher number of cigarettes per day showed a higher drug problem severity, compared to those reporting a lower number of cigarettes per day. Participants in the three groups showed a decreased drug problem severity at the 6-month follow-up compared to the baseline. At the 12-month follow-up, the heaviest smokers (in the 75th percentile) showed a slight decrease in the drug problem severity, while the other smoking groups (in the 50th percentile and the 25th percentile) showed an increase of drug problem severity (although still lower than baseline). The same set of analyses, using CO-level and nicotine dependence rather than number of cigarettes per day, produced different results. In those analyses CO-level had only one significant effect, such that participants who reported higher CO-levels were more likely to report a lower degree of psychiatric problems for an average time point over 12 months (data not shown). In addition, nicotine dependence as measured by the CDIS-IV was not associated with any ASI composite score. The methadone treatment condition at baseline was controlled in the regression model, and no significant effects were found related to whether participants received or did not receive methadone treatment at baseline.

DISCUSSION

The current study examined smoking behaviors among opioid-dependent clients in a TC. Among participants who were followed at all three time points, 82% reported smoking at all times and 13% shifted from smoking to non-smoking status at some time after admission. This was verified using both the self-reported number of cigarettes per day and CO-level. The

residential treatment program where the study was conducted complied with California indoor smoke-free requirements, and limited smoking cessation groups (but no nicotine replacement or other smoking medication) were available to program residents. The finding that some patients were able to quit smoking is noteworthy as a counterpoint to staff beliefs that patients are not interested in quitting smoking,³ and may encourage drug treatment providers to include smoking cessation among their services.

CO-level was related to the ASI psychiatric composite, such that participants with higher CO-levels were more likely to report lower psychiatric severity at any time point. The number of cigarettes per day at baseline was associated with the ASI drug composite score, reflecting that participants who reported a greater number of cigarettes used per day showed higher levels of drug problem severity for an average time point over a 12-month period. This appears consistent with prior research.^{6,7} We found “the number of cigarettes-by-time” interaction for the ASI drug composite score, such that heavy smokers reported a slight decrease in drug problem severity from 6 to 12 months, while lighter smokers showed a slight increase in drug severity during the same period. Although statistically significant, these differences were observed from 6 to 12 months only and were small in absolute terms, so regression to the mean is a likely explanation.

The findings reported here have limited generalizability because the sample included opioid-dependent clients who entered a specific type of residential (TC) treatment. In addition, the parent study was not designed to examine smoking behavior specifically, and no data were collected concerning participant interest in quitting smoking, strategies used to quit, or duration of quit attempts. At the same time this is one of a few longitudinal studies that examined smoking behaviors among opioid-dependent clients in drug treatment. Heavier smoking was related to higher drug severity, so that heavier smokers in drug treatment may require more intensive or more extended smoking cessation interventions. Importantly, a small proportion of drug treatment clients in this study reported quitting smoking over time. Although number of cigarettes was based on self-report, self reports were verified by CO-level in every instance where both measures were available. This demonstrates that some clients in drug treatment do quit cigarette smoking with minimal intervention. Specific smoking cessation intervention in drug treatment settings, accompanied by NRT and according to clinical practice guidelines,²³ may improve the proportion of persons in drug treatment who can achieve smoking cessation.

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Table 1
Smoking Behaviors among Opioid Dependent Clients

	Baseline (n=231)	6 months (n=219)	12 months (n=210)	P-value
Current smokers (% , n)	95% (219)	85% (186)	88% (185)	.002 [*]
Number of cigarettes per day (Mean, SD) [†]	11.4 (7.9)	11.1 (9.0)	11.0 (8.3)	.87
CO-level (Mean, SD) ^{**}	13.4 (7.4)	12.6 (8.7)	13.0 (9.1)	.56

* p < .05

† Mean number of cigarettes per day for current smokers only.

** Missing number of cases for CO-level is 21 at 12-months follow-up.

Table 2
Analysis of Effects of Number of Cigarettes Per Day for ASI Composites (N = 231)

	ASI Alcohol Composite		ASI Drug Composite		ASI Medical Composite		ASI Psychiatric Composite	
	Parameter estimate	P-Value	Parameter estimate	P-Value	Parameter estimate	P-Value	Parameter estimate	P-Value
Time	0.002	0.58	-0.0004	0.91	0.005	0.41	0.008	0.04*
Number of Cigarettes per day	0.003	0.15	0.005	0.002*	0.007	0.06	0.003	0.14
Number of Cigarettes by Time Interaction	-0.0003	0.33	-0.001	0.01*	-0.0004	0.49	-0.0002	0.41

**This model controlled current methadone use at baseline.

* p < .05