**Background.** Evidence supports phenomenological, clinical, epidemiological and biological links between problem/pathological gambling and tobacco use. An improved understanding of the relationship would be helpful in treating individuals with co-occurring pathological gambling and nicotine dependence.

**Methods.** This study investigates the tobacco use behaviors of 225 adults (mean age $SD = 47.3 \pm 11.0$ years; number of women $= 120 [53.3\%]$) who were recruited for pharmacological treatment of pathological gambling. All subjects met criteria for pathological gambling based upon the Structured Clinical Interview for Pathological Gambling (SCI-PG), a DSM-IV-based diagnostic interview, and were assessed at baseline with multiple reliable and valid measures of gambling severity.

**Results.** 159 (70.7\%) subjects were either current ($n = 110; 48.9\%$) or prior daily smokers ($n = 49; 21.8\%$). Compared with the group of never smokers, the group of current and prior daily smokers was more likely to be older ($F = 3.55; df = 2, 222; p = 0.030$), be female (chi square $= 10.85; df = 2, p = 0.004$), and have stronger urges to gamble ($F = 128.15; df = 2, 222; p < 0.001$).

**Conclusions.** Daily tobacco use in treatment-seeking pathological gamblers is common and associated with more severe urges to gamble. Treatments targeting urges in individuals with pathological gambling and current or prior daily tobacco use should be examined.

**Keywords** Pathological gambling, Nicotine, Tobacco, Impulse control disorders, Urges/cravings

**INTRODUCTION**

Mounting evidence supports phenomenological, clinical, epidemiological and biological links between problem/pathological gambling and drug addictions, including tobacco use (1–3). Given the high rates of tobacco use in individuals who gamble excessively (1,4) and the adverse long-term effects of tobacco smoking, an improved understanding of the relationship between problem/pathological gambling and tobacco use has significant clinical implications.

Several studies have examined the rates and correlates of tobacco use among problem/pathological gamblers (1,2,5,6). Rates of daily tobacco use among problem/pathological gamblers have varied from 41% to 69% (4–6). Studies also suggest that tobacco use in problem/pathological gamblers is associated with both more severe substance use problems (2,3) and more severe gambling problems in some (2) but not other (3) studies.
pharmacological studies (8–10). The Institutional Review Board of the University of Minnesota approved the studies and the consent statements for the various pharmacological studies. All study participants provided written informed consent. All subjects, including those not suitable for inclusion in pharmacological studies, were assessed by the first author as described below. For purposes of assessing tobacco use, all subjects who met DSM-IV criteria for PG were included in the present study.

Assessments

All subjects were administered the Structured Clinical Interview for DSM-IV (SCID) (11) to assess psychiatric diagnoses. All subjects met criteria for PG based upon the Structured Clinical Interview for Pathological Gambling (SCI-PG), a clinician-administered, DSM-IV-based diagnostic interview that is compatible with the SCID and assesses both the ten inclusion criteria and the exclusionary criterion of PG: “not better accounted for by a Manic Episode.” The SCI-PG has demonstrated excellent reliability, validity and classification accuracy in preliminary testing of individuals with gambling problems (12).

Because the SCID does not include modules for impulse control disorders, all subjects were screened with the Minnesota Impulsive Disorders Interview (13), a semistructured clinical interview for the following disorders: trichotillomania, pyromania, intermittent explosive disorder, kleptomania, com};

How many cigarettes did you smoke daily, on average? How many cigarettes did you smoke daily on average when you did smoke?"

Statistical Analysis

Subjects were assigned to one of three categories based on tobacco use history: never smoked daily, smoked daily in the past, smokes daily currently. Between-group differences were tested using the Pearson chi-square and 2-sided Fisher exact test for categorical variables and 2-tailed independent sample t-tests for continuous variables. Analysis of variance was used to examine the group differences between mean scores on the various assessments. Evaluations of gambling severity were adjusted for age and gender as these variables differed between groups. Because multiple pairwise comparisons were made, a Bonferroni correction was used: results which are statistically significant are associated with p ≤ 0.008.

RESULTS

Two hundred and twenty five subjects (mean age ± SD = 47.3 ± 11.0 years [range 21 – 73 years]; male: n = 105 [46.7%]; female: n = 120 [53.3%]) were assessed. One hundred fifty nine subjects (70.7%) were either current (n = 110; 48.9% of total sample; 69.2% of lifetime daily smokers) or prior daily smokers (n = 49; 21.8% of total sample; 30.8% of lifetime daily smokers). Sixty-six (29.3%) subjects had never smoked tobacco daily. Of the 159 subjects who had smoked daily at some time in their lives, the maximal mean number of cigarettes smoked regularly on a daily basis was 24.2 ± 10.5.

A greater percentage of women comprised the group of current and prior daily smokers (X² = 10.85; df = 2; p = 0.004), with similar proportions of women in the current and prior smoking groups (60.9% and 59.2%, respectively). The subjects who reported no history of daily smoking were younger (44.4 ± 12.3 years) than those who currently smoked (48.0 ± 9.5 years) or had smoked in the past (49.4 ± 11.9 years; F = 3.55; df = 2,222; p = 0.030). There were no significant differences in other demographic features (Table 1).

Clinical gambling characteristics of subjects stratified by smoking status are presented (Table 2). Subjects with past or current daily tobacco use reported significantly greater intensity of urges associated with gambling as measured by item #1 on the G-SAS: “If you had unwanted urges to gamble during the past week, on average, how strong were your urges?” (F = 128.15; df = 2,222; p = <0.001). Overall gambling severity and social and occupational functioning were similar between groups. High rates of co-occurring Axis I disorders (including major depressive disorder, non-tobacco substance use disorders, and non-gambling impulse control disorders) were observed in all groups of pathological gamblers stratified by...
smoking status, and no significant between-group differences were observed in rates of comorbidity (data not shown).

**DISCUSSION**

Current daily tobacco use in treatment-seeking pathological gamblers in this study (49%) appears higher than in the general population (25%) (16), and daily tobacco use was associated with more intense urges to gamble. We also observed a relatively large proportion of prior daily smokers. However, the proportion of prior as compared with current daily smokers (30.8% vs. 69.2%) is lower than the approximately 50%/50% rate observed in the general population (17). These findings suggest that, like individuals with other mental health disorders, it is more difficult for individuals with PG to quit smoking and that increased smoking cessation efforts are needed for these patients.

The observation of more intense urges to gamble in both current and prior daily smokers suggests that the relationship...
reflects a trait rather than state characteristic. The finding of more intense gambling urges associated with tobacco use among pathological gamblers may have important treatment implications. In terms of pharmacological interventions, an opioid antagonist or bupropion may be appropriate for patients suffering from both problems. In a randomized clinical trial of the mu-opioid antagonist, naltrexone, in the treatment of PG, positive outcome was significantly greater for subjects reporting more intense urges to gamble (8). Similarly, in a study of smoking cessation, the addition of naltrexone to nicotine patch therapy resulted in a reduced desire to smoke (18). Given that both PG and tobacco use are generally defined as urge-driven behaviors (19), the finding that the co-occurrence of PG and daily smoking is associated with more severe urges to gamble may suggest a common pathophysiology in motivational circuitry (20). Therefore, clinicians may consider an opioid antagonist or bupropion for the treatment of pathological gamblers who report daily tobacco use. Bupropion effectively treats nicotine dependence (21), and emerging data suggest that bupropion may be efficacious and well-tolerated in the treatment of PG (22). Thus, the efficacy and tolerability of bupropion in the treatment of co-occurring PG and nicotine dependence warrant direct examination. Although selective serotonin reuptake inhibitors (SSRIs) have shown benefit for PG (23), their efficacy in the reduction of tobacco use is not substantial (24).

Multiple psychosocial treatments have also been investigated for both PG and tobacco use disorders. Cognitive-behavioral therapy, as well as brief interventions in the form of workbooks, have demonstrated success in randomized trials for PG (25–29). Similarly, cognitive-behavioral strategies have shown efficacy in reducing smoking behavior (30–33). Psychosocial interventions addressing both tobacco use and gambling, therefore, may be important considerations for patients with these co-occurring disorders.

Treatment of either PG or tobacco use could be complicated or compromised by the presence of the other untreated condition. Treating gambling alone may not be effective if the tobacco use is exerting a causal or maintaining influence on the treated condition. To our knowledge, no research has been published on the treatment of co-occurring tobacco use in patients with PG. Given the high rates of daily tobacco use in individuals with PG, research on effective treatments for PG patients with co-occurring tobacco use is needed.

This study has multiple limitations. First, the fact that subjects responded to advertisements for pharmacological treatment may have led to some bias with respect to subject selection. Second, subjects were categorized based on daily tobacco smoking. Subjects with current or past episodic use (e.g., “chipping”) or other forms of tobacco consumption (e.g., chewing) may not have been adequately captured by the semistructured interview, and therefore the relationship of these forms of tobacco use to gambling severity cannot be adequately addressed by this study. Third, treatment-seeking pathological gamblers may differ from individuals who do not seek treatment or have a less severe form of gambling addiction. The question, therefore, arises as to whether these results generalize to the larger population of problem/pathological gamblers.

In conclusion, the results suggest that tobacco use is common among subjects with PG. Given the adverse health measures associated with tobacco use, it is important that clinicians inquire about tobacco use in individuals with PG. Improved smoking cessation efforts appear important in individuals with PG. Moreover, as the presence of a current or prior history of tobacco use was associated with more severe gambling urges, this feature might be used to guide the development of more effective treatments. Further research, particularly prevalence and treatment studies involving larger samples, is needed to more effectively target smoking behaviors in people with pathological gambling.

ACKNOWLEDGMENTS

This study was supported in part by GlaxoSmithKline, Contral Pharma, and a Clinician Scientist Training Program grant from the National Institute on Drug Abuse (K12-DA 00167).

REFERENCES

2. Petry NM, Oncken C: Cigarette smoking is associated with increased severity of gambling problems in treatment-seeking gamblers. Addiction 2002; 97:745–753
5. Smart RG, Ferris J: Alcohol, drugs and gambling in the Ontario adult population. Can J Psychiatry 1996; 41:36–45


