Prevalence and Predictors of Problem Drinking Among Primary Care Diabetic Patients

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Background. Alcohol abuse among patients with diabetes mellitus is dangerous and complicates therapy, but its prevalence and the factors that predict it are unknown. This study examined the prevalence of problem drinking among a large number of primary care diabetic patients, exploring its relation to age, race, sex, psychological factors, and other health behaviors.

Methods. Volunteers with insulin-dependent diabetes mellitus and non–insulin-dependent diabetes mellitus were surveyed at three primary care practice sites. Patients completed a health risk appraisal designed to elicit alcohol use and other health practices, and two psychometric instruments: the Brief Encounter Psychosocial Instrument and the Affect Balance Scale. Fasting blood glucose and hemoglobin A_{1C} levels were also determined.

Results. Of 395 diabetic patients, 32 (8.1%) had a drinking problem as defined by answering yes to the question "Have you ever had a drinking problem?" or reporting their last drink to be within 24 hours, or both. Patients with a drinking problem coped less well with psychological stress and had a more highly negative affect than those without a drinking problem. Depression, black race, and male sex were significantly associated with problem drinking (odds ratios = 8.42, 2.70, and 3.80, respectively). Problem drinking did not predict glycemic control but was associated with smoking and less frequent glucose monitoring.

Conclusions. The prevalence of problem drinking among patients with diabetes mellitus appears lower than among other medical outpatient populations and is in keeping with the prevalence found in community surveys. While the lack of association between problem drinking and glycemic control in diabetic patients may be surprising, these data help define the characteristics of this subgroup of diabetic patients and highlight the need for family physicians to intensify alcohol screening efforts in this population.

Key words. Diabetes mellitus; alcoholism; blood glucose; health behaviors; models, psychological.
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Alcohol abuse affects about 10% of the general population[1-3] and an even larger percentage of medical clinic and hospitalized patient populations.[4-7] The proportion of diabetic patients suffering from alcohol abuse is unknown and may be more or less than that seen among patients with other medical problems. Alcohol abuse in patients with diabetes mellitus is not only dangerous to the patient, but also complicates diabetic therapy. Aside from the adverse cardiovascular effects of alcohol abuse,[8,9] its excessive use inhibits gluconeogenesis, making diabetic patients prone to sudden and severe hypoglycemia[10,11]; induces transient hyperglycemia[11,12]; and predisposes patients to alcoholic ketoacidosis.[12,13]

Moreover, many studies have shown that certain behavioral and affective disorders are more common among heavy drinkers,[2,14-17] particularly anxiety, depression, psychosis, and antisocial personality. Finally, alcohol abuse often coexists with other high-risk behaviors

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such as cigarette smoking,[18,19] not using seat belts,[20] and illicit drug use.[2,21,22]

Because of the dangers associated with alcohol abuse, warning diabetic patients against excessive drinking remains a standard of good medical care.[10] Although the prevalence and demographics of alcohol abuse are well known in other populations,[1–7] the prevalence and the predictors of problem drinking among diabetic patients are unknown.

Using Cyr and Wartman's definition of an alcohol problem,[23] we studied the prevalence of problem drinking and factors associated with it in primary care diabetic patients. Our goal was to test three hypotheses: (1) demographic (age, race and sex) and psychological variables would correlate with problem drinking among diabetic patients; (2) problem drinking would be associated with adverse health behaviors among diabetic patients, namely, smoking, lack of daily self-monitoring of blood glucose, and lack of exercise; and (3) problem drinking would be negatively associated with measured and perceived diabetic glycemic control.

Methods

Three hundred ninety-five patients over the age of 16 years with insulin-dependent diabetes mellitus (IDDM, n = 77) or non–insulin-dependent diabetes mellitus (NIDDM, n = 318) were recruited from a large family medicine ambulatory care unit, a university medical center pediatric clinic, and a neighborhood community health center through a series of mailed invitations as described elsewhere.[24] All cases met World Health Organization (WHO) criteria[25] for either IDDM or NIDDM.

We chose a screening tool for determining a drinking problem based on its validity and ease of incorporation into a busy clinical practice. Hence, we selected Cyr and Wartman's[23] two questions: "Have you ever had a drinking problem?" and "When was your last drink?" These authors define a drinking problem as an affirmative answer to the first question or a patient stating that he or she had a drink within the previous 24 hours, or both. Compared with the Michigan Alcoholism Screening Test (MAST),[26] these items have a sensitivity of detecting an alcohol problem of 91.5%, a specificity of 89.7%, and a positive predictive value of 69.4%.[23]

Patients completed a series of questionnaires before their appointments, including a modification of the Healthier People Health Risk Appraisal,[27] which elicited a history of current or previous cigarette smoking and the duration, type, and frequency of exercise. Two standardized psychometric instruments were also administered to patients: the Brief Encounter Psychosocial Instrument (BEPSI), a five-item questionnaire with a 10-point Likert-type scoring scale used to measure patient ability to cope with psychological stress[28]; and Derogatis' Affect Balance Scale (ABS), a 40-item questionnaire with a 5-point Likert-type scale reflecting positive as well as negative self-perceptions of affect.[29] After an overnight fast, a venous blood sample was obtained from each patient for glycosylated hemoglobin A_{1C} (normal values ranging from 2.9% to 5.1%) and blood glucose determination. Finally, patients were asked their perception of their glycemic control over the past month using an 11-point Likert-type scale (0 = poor; 10 = excellent).

Health behaviors assessed in this study were exercise, cigarette smoking, and blood glucose self-monitoring. A cut-off level of greater than or equal to 600 kcal per week was selected as the definition of exercise based on the type[30] and intensity[31] of patients' self-reported physical activity. This level is approximately equivalent to walking 2 miles three times a week and is the minimum quantity of exercise for maintaining cardiovascular fitness as set forth by the American College of Sports Medicine.[32] Smoking status was split into two groups, current smokers and nonsmokers, the latter category including former and never smokers. Patients were also asked about the frequency with which they checked their own blood glucose, and these responses were dichotomized into "at least daily" vs "not daily." Hemoglobin A_{1C} levels were dichotomized into high and low levels (>7% and ≤7%, respectively). Blood glucose levels were also dichotomized into high and low levels (>140 mg/dL and ≤140 mg/dL, respectively). Perceived glycemic control was dichotomized into good and poor (>5 and ≤5, respectively).

Statistical analyses were performed using the Centers for Disease Control and Prevention statistical package *EpiInfo* and the Statistical Packages for Social Sciences (version 2, 1988). "Ill" and "Well" ABS scores were derived from the Likert-type responses to the anxiety/guilt/hostility/depression subscales and the joy/contentment/passion/vigor subscales, respectively. Using these ABS scores, we created categories of high negative and high positive affect corresponding to the upper decile of scores for the study population on the ABS "Ill" and ABS "Well" subitems, respectively. Patients with high positive affect would thus have experienced joy, contentment, passion, and vigor much more frequently in the past month than patients without positive affect. Similarly, patients with high negative affect would have experienced anxiety, guilt, hostility, and depression much more frequently in the past month. The BEPSI was dichotomized into >30 or ≤30, with the higher category indicating poor coping with psychological stress.

Table 1. Patient Characteristics, by Drinking Problem Status

Characteristic	Patients with a Drinking Problem* (n = 32)	Patients with No Drinking Problem (n = 363)	P Value†
Age, y, mean ± SD	54 ± 12	53 ± 16	NS
IDDM, %	16	20	NS
Male, %	66	41	.01
Black, %	56	39	.052
Glycosylated hemoglobin, %, mean ± SD	7.3 ± 2.0	7.4 ± 2.1	NS
Glucose, mg/dL, mean ± SD	225 ± 81	200 ± 88	NS
Self-perceived good glycemic control, %	50	53	NS

*A drinking problem was defined as having had a drinking problem in the past and/or having had a drink within the last 24 hours.
†Chi-square statistic for percentage or Student's t test for means.
IDDM denotes insulin-dependent diabetes mellitus; SD, standard deviation, NS, not significant.

Differences between means were calculated by Student's t test. Categorical data were analyzed by chi-square and backwards stepwise logistic regression. Two models were developed in the logistic regression analysis. In the first, a drinking problem was entered as the outcome (dependent) variable with psychometric scores, age, race, sex, and type of diabetes (ie, IDDM vs NIDDM) as predictor variables. In the second model, smoking, exercise, and glycemic control variables were the outcome variables, and drinking problem status (controlling for age, race, and sex) was the independent predictor. Psychometric scores in the first model were categorized for ease of interpretation of odds ratios. However, the data were also analyzed (but not shown) using continuous scores. This did not alter which variables remained in the models; therefore, our conclusions were unchanged.

Results

Patient Characteristics. Of 395 patients screened, 32 (8.1%) met the case definition for a drinking problem (5 IDDM and 27 NIDDM patients). Patient characteristics by drinking problem status are summarized in Table 1. Subjects with and without a drinking problem did not vary significantly by age, type of diabetes (IDDM vs NIDDM), level of glycosylated hemoglobin, or blood glucose level. A significantly higher percentage of the patients with a drinking problem were male compared with the patients without a drinking problem. Although a higher percentage of patients with a drinking problem were black, and there was a trend toward higher fasting glucose values among problem drinkers, neither of these factors was statistically significant. Self-perceptions of glycemic control did not differ between patients with and without a drinking problem.

Problem drinkers had significantly poorer ability to cope with psychological stress (mean BEPSI = 27.3 ± 11.7, P = .018), and higher negative affect scores (mean ABS(Ill) = 34.8 ± 15.2, P < .001) than their counterparts without a drinking problem (data not shown). There was no significant difference for scores on ABS(Well) between the two groups.

The practice of preventive health behaviors in relation to drinking problem status is shown in Table 2. A significantly higher percentage of patients with a drinking problem smoked; a lower percentage of these patients checked their own blood glucose at least daily. Exercise levels did not differ significantly between the two groups.

Predictors of a drinking problem. The logistic regression model for psychological and demographic predictors of a drinking problem is summarized in Table 3. Patients with a high negative affect were 8.42 times more likely than those with lower negative affect scores to have a drinking problem. Black patients were 2.70 times more likely to have a drinking problem than white patients, and men were almost four times more likely than women to have a drinking problem. Race and sex interacted in a

Table 2. Health Behaviors, by Drinking Problem Status

Behavior	Patients with a Drinking Problem* (n = 32)	Patients with No Drinking Problem (n = 363)	P Value†
Checks blood glucose, %	20	38	.047
Smokes, %	53	18	<.001
Exercises at ≥600 kcal/wk, %	22	18	NS

*A drinking problem was defined as having had a drinking problem in the past and/or having had a drink within the last 24 hours.
†Chi-square statistic.

Table 3. Predictors of a Drinking Problem* (All Subjects)

Variables	Odds Ratio (95% CI)†
Negative affect‡	8.42 (2.41–29.4)
Black	2.70 (1.23–5.88)
Male	3.80 (1.66–8.69)
Black men§	13.40 (2.76–64.5)

*A drinking problem was defined as having had a drinking problem in the past and/or having had a drink within the last 24 hours. Model includes all subjects.
†Odds ratios derived from stepwise logistic regression.
‡Defined as scoring in top decile of study population on anxiety/guilt/hostility/depression questions of the Affect Balance Scale (ABS).
§Compared with white women.

statistically significant manner. In an analysis of this interaction, black men were 13.4 times more likely to have a drinking problem than the lowest risk category (white women), showing that the effects of race and sex are multiplicative.

Drinking problem status as a predictor of behaviors. Controlling for age, race, and sex, problem drinking predicted only current smoking (odds ratio = 5.51, 95% CI = 2.59 to 11.73), but was not associated in logistic regression modeling with exercise or any glycemic control variables (data not shown).

Discussion

The overall prevalence (8.1%) of a drinking problem in this population of patients with diabetes mellitus is lower than the 20.3% found among medical outpatients using the same questionnaire[23] or the 19.4% prevalence at a family practice center.[4] This percentage is more in keeping with the 8% to 10% prevalence documented among community samples.[1-3] One possibility for this lower prevalence is selection bias: participants in our study may have been healthier than the general medical patient populations of other studies. This seems unlikely, however, since our subjects were a subset of patients with a chronic disease who were seeking their usual medical care at the three practice sites. Further, the demographics of the patients in our study reflect the national population of diabetic patients in terms of age, race, and sex,[33-35] as discussed elsewhere.[36] A second possibility is that diabetic patients may be more responsive to the admonition of their physicians to moderate alcohol consumption. If such responsiveness were confirmed by further research, it would have important clinical implications for the care of diabetic problem drinkers. A third explanation of the lower prevalence of problem drinking among diabetic patients is that these persons may have experienced alcohol's severe metabolic consequences, and thus may have tempered their drinking behavior accordingly.

Poorer coping with psychological stress (ie, high scores on the BEPSI) and a higher percentage of patients with negative affect (ie, more frequent feelings of guilt, hostility, anxiety, or depression) among our patients with a drinking problem are in keeping with previous reports of alcoholism, anxiety, and depression.[14-17] The over eightfold increase in risk for problem drinking that diabetic patients with highly negative affect possess (Table 3) also is not surprising, but without long-term follow-up, it is difficult to tell whether alcoholism or depression is the primary disorder.[17,37-39]

The lack of a relation between glycemic values and problem drinking may be surprising given the adverse metabolic effects of alcohol,[11-13] but others[40,41] have reported similar findings in diabetic patients. However, given the lack of any biochemical differences between the two groups, the lack of association between perceived glycemic control and an alcohol problem comes as no surprise.

Smoking and daily blood glucose monitoring are the only health behaviors that differed significantly between patients with and without a drinking problem (Table 2). The strong correlation between problem drinking and smoking is consistent with other studies.[18,19] On the other hand, less frequent blood glucose monitoring among diabetic patients with a drinking problem has not been previously reported.

Limitations to this study include reliance on self-reported data, generalizability to other primary care diabetic patients, and the definition of a drinking problem.

Underreporting and overreporting of health behaviors, particularly alcohol-related behaviors,[42] are common in surveys.[43] This bias is sometimes difficult to avoid, but for alcohol use, at least, an objective measure of intake would have strengthened this study.

The age, race, and sex characteristics of our diabetic patients reflect those found nationally for IDDM[33] and NIDDM,[34,35] bolstering the generalizability of these data. Moreover, the 2:1 ratio of male problem drinkers to female problem drinkers and the higher prevalence of problem drinking among blacks in this middle-aged population coincides with the demographic composition of alcoholic groups reported in national surveys.[44,45]

A potentially more difficult limitation of this study is its definition of an alcohol problem. Although the screening tool we chose has a high sensitivity, specificity, and positive predictive value,[23] it was validated using another screening tool (the MAST)[26] as the reference standard. Nonetheless, these quickly administered questions seem appropriate to use among diabetic patients for at least two reasons. First, one is inclined to accept as true a patient's declaration of an alcohol problem. Second, most patients would try to avoid alcohol use 24 hours before a medical appointment.[23] This may be particularly true of

diabetic patients who often "go into training" in an attempt to improve glycemic control prior to scheduled physician visits.[46] Alcohol use by a diabetic patient 24 hours before a clinic appointment might therefore indicate the increased likelihood of not being able to abstain from alcohol, ie, of having a drinking problem. Still, our study might have been strengthened by including a better known questionnaire such as the MAST or the CAGE.[47]

We anticipated these potential case definition difficulties and performed a separate analysis (not shown) based on affirmative answers to both "Have you ever had a drinking problem?" and "Was your last drink within 24 hours?"; this modification did not alter our conclusions.

These data show that certain characteristics strongly correlate with problem drinking among diabetic patients and help define a group in which family physicians should intensify their screening efforts. Persons with diabetes mellitus are particularly prone to the severe metabolic and physiologic sequelae of excessive drinking,[10] to say nothing of the host of other adverse medical and social consequences common to all problem drinkers.[48] Black male diabetic patients and diabetic patients with a highly negative affect are at especially high risk for an alcohol problem. Further, diabetic problem drinkers are 5.5 times more likely to smoke than diabetic patients without a drinking problem, greatly increasing their already elevated cardiovascular risk profile.[8,9] Once identified, diabetic patients with a drinking problem must be encouraged to stop drinking and perhaps even seek treatment for their alcohol problem.

Acknowledgment

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