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Illicit substance use in US adults with chronic low back pain

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Abstract

Study Design—population-based cross sectional survey.

Objective—To compare the prevalence of illicit drug use among US adults with chronic low back pain (cLBP) and without.

Summary of Background Data—While addictive medications, such as opioids and benzodiazepines, are frequently prescribed to patients with cLBP, little is known about illicit drug use among Americans with cLBP.

Methods—We used data from the back pain survey, administered to a representative sample of US adults aged 20-69 (N = 5103) during the 2009-2010 cycle of the National Health and Nutrition Examination Survey (NHANES). Participants with pain in the area between the lower posterior margin of the ribcage and the horizontal gluteal fold for at least 3 months were classified as having cLBP (N = 700). The drug use questionnaire was self-administered in a private setting, and included data on lifetime and current use of marijuana or hashish, cocaine, heroin, and methamphetamine. Chi-square tests, one way ANOVA and logistic regression, adjusted for age, gender, race and level of education, were used for comparisons.

Results—46.5% of US adults with cLBP used marijuana vs 42% of those without cLBP (aOR 1.36, 95% CI 1.06-1.74). 22% vs 14% used cocaine (aOR 1.80, 95% CI 1.45-2.24), 9% vs 5% used methamphetamine (aOR 2.03, 95% CI 1.30-3.16), and 5% vs 2% used heroin (aOR 2.43, 95% CI 1.44-4.11). Subjects with cLBP who reported lifetime illicit drug use were more likely to have an active prescription for opioid analgesics than those without illicit drug use history: 22.5% vs 15.3%, p = 0.018.

Conclusions—cLBP in community-based US adults was associated with higher odds of using marijuana, cocaine, heroin, and methamphetamine. Prescription opioid analgesic use was more common in cLBP sufferers with a history of illicit drug use.

Keywords

low back pain; chronic pain; illicit drugs; epidemiology; drug abuse; marijuana; heroin; cocaine; alcohol; tobacco; opiate abuse; narcotics

Introduction

Prescription opioids are widely used for chronic low back pain (cLBP) in the US.^{1,2} Many concerns have been raised regarding opioid prescribing, including addictive potential, misuse, and accidental overdose.^{3,4,5,6} Several studies have shown that a history of illicit drug use is associated with prescription opiate misuse.^{7,8,9,10} Little is known about the prevalence of illicit drug use in Americans with chronic low back pain.

Hence, we set out to determine the extent of illicit drug use in community-based US adults with chronic low back pain. Our primary objective was to compare the prevalence of illicit drug use among US adults with cLBP and those without cLBP. Additionally, we wanted to know whether prescription opioid use was associated with a history of illicit drug use among chronic low back pain sufferers.

Materials and Methods

We analyzed data from the continuous National Health and Nutrition Examination Survey (NHANES), a biannual research survey conducted by the National Center for Health Statistics to assess the health and nutritional status of the US population. The survey combines household interviews with physical examinations, conducted at mobile examination centers. The NHANES methodology generates a research sample that is representative of the US population.¹¹ During the 2009-2010 NHANES cycle, a comprehensive back pain questionnaire was administered with the primary goal of establishing the prevalence of inflammatory back pain in US adults.¹² The questionnaire included all adult participants ages 20 to 69 (N=5103). We identified the cLBP sample from participants who reported current pain in the area between the lower posterior margin of the ribcage and the horizontal gluteal fold at the time of evaluation with a history of pain lasting almost every day for at least 3 months (N=700). To be classified as having cLBP, participants had to answer “yes” to two questions: “Was there one time when you had pain, aching or stiffness almost every day for 3 or more months in a row?” and “Do you still have pain, aching or stiffness?”. We merged the back pain survey data with the NHANES questionnaires on illicit drug use and prescription medication use, as well as demographics, income, occupational history, tobacco and alcohol use.

The drug use questions focused on lifetime and current use of marijuana or hashish, cocaine, heroin, and methamphetamine. Questions were self-administered in a private setting, using the Audio Computer-Assisted Self-Interviewing system. Current drug use was defined as at least one instance within the last 30 days. Results for marijuana and hashish use were

available on all participants up to age 59. For all other substances, results were available on the full sample (up to age 69). For estimates of high-risk alcohol use behavior, we provide a modified Audit-C score, as for question 3 NHANES asked about 5 or more drinks per day, rather than 6 or more drinks per day as in standard Audit-C.¹³

Primary sample unit (“sdmvpsu”) and stratum (“sdmvstra”) variables, as well as 2-year interview weights (“wtint2yr”) were used to obtain national estimates for household questionnaire variables, and 2-year MEC weights (“wtmec2yr”) – for MEC variables. Chi-square test and one way ANOVA were used for unadjusted between-group comparisons of categorical variables and continuous variables, respectively. Logistic regression was used to produce adjusted odds ratios for the primary binary outcome (cLBP). As heterogeneity of demographic characteristics was observed in the groups with and without cLBP, logistic regression models were adjusted for age, race, gender, and education level.

To determine whether lifetime and current illicit drug use were associated with prescription opioid analgesic use, we performed two sub-group analyses in the cLBP group, in which we compared the proportions of subjects with active opioid prescriptions stratified on lifetime and current illicit substance use. A 95% confidence level was set for all tests of significance. All statistical analyses were performed in SAS 9.4 (SAS Institute, Inc., Cary, NC).

Results

Demographic characteristics by chronic low back pain status are summarized in Table 1. The point prevalence of cLBP in US adults aged 20-69 years old was 13.1%. US adults with cLBP were older than those without cLBP, with the age distribution skewed towards the 5th and 6th decades of life. There were more women in the cLBP group than in the non-cLBP group (55.8% vs 50.1%, $p = 0.036$), and more Caucasians (74.9% vs 64.9%, $p < 0.0001$). Adults with cLBP were less educated, with 18.6% reporting a college degree or higher, compared to 30.2% of those without cLBP ($p = 0.0001$).

The distribution of illicit drug, alcohol, and tobacco use among US adults overall, and according to cLBP status, is shown in Table 2. The prevalence of lifetime use of any illicit drug (marijuana, cocaine, heroin or methamphetamine) was 49.0% in the cLBP group, and 43.3% in the non-cLBP group, aOR 1.42 (1.12-1.79), $p = 0.0035$. The prevalence of current illicit drug use in the past 30 days was also higher in the cLBP group: 14.2% compared with 9.3% among those without cLBP, AOR 1.91 (1.34-2.73), $p = 0.0004$. Additionally, adults with cLBP were significantly more likely to smoke tobacco: aOR 1.44 (1.12-1.86) for former smokers and 1.77 (1.37-2.30) for current smokers, $p = 0.0001$. Although a trend for increased alcohol use was observed in the cLBP group, there was no statistically significant difference after adjustment for age, race, gender, and education: aOR 1.21 (0.96-1.52), $p = 0.114$. In addition, no difference was observed in the prevalence of high-risk alcohol behavior by modified AUDIT-C among subjects with cLBP and without.

We further examined illicit drug use prevalence by substance (Table 3), adjusted odds ratios are shown in Figure 1. For lifetime use, marijuana was the most commonly reported drug in US adults, followed by cocaine, methamphetamine, and heroin. 46.5% of subjects with

cLBP reported lifetime marijuana use, compared with 42% of subjects without cLBP: aOR 1.36 (1.06-1.74), $p = 0.016$. 21.9% of those with cLBP reported lifetime cocaine use, versus 13.9% of those without cLBP: aOR 1.80 (1.45-2.24), $p < 0.0001$. Methamphetamine use was reported by 9.2% of subjects with cLBP and 4.6% of subjects without cLBP: aOR 2.03 (1.30-3.16), $p = 0.0019$. Heroin use was 5% in the cLBP group and 2.1% in those without cLBP: aOR 2.43 (1.44-4.11), $p = 0.0009$. Similar patterns were observed for current substance use within the last 30 days.

We evaluated prescription opioid analgesic use within the cLBP group in two subgroup analyses (Figure 2). Subjects with cLBP who reported lifetime illicit drug use were more likely to have an active prescription for opioids than subjects with cLBP who did not use illicit drugs: 22.5% vs 15.3%, $p = 0.018$. Among current illicit drug users with cLBP, 25.7% had an active prescription for an opioid analgesic vs 17.7% of current non-users with cLBP; this difference, however, was not statistically significant, $p = 0.250$.

Discussion

After accounting for heterogeneous demographic characteristics, lifetime and current illicit drug use (including specific use of marijuana, cocaine, heroin, and methamphetamine) were each associated with the presence of cLBP among a representative sample of community-dwelling US adults aged 20-69 years. Among adults with cLBP, those with a history of lifetime illicit drug use were more likely to have an active prescription for an opioid analgesic than cLBP sufferers without an illicit drug use history.

Our general population estimates for illicit substance use were consistent with the national population surveys from the same years (2009-2010).¹⁴ The prevalence of illicit drug use in the US has increased since 2010, especially among adults in their 50s and 60s, the age group with the highest prevalence of back pain in our study.¹⁵ Few previous studies have examined the association of illicit drug use with cLBP among adults living in the US. A 1996 family medicine clinic study from Madison, WI, found no difference in lifetime substance abuse between patients with cLBP ($N = 61$) and without ($N = 181$) in the 18-59 year age group; this study, however, used phone interviewing to collect substance abuse information.¹⁶ The National Comorbidity Survey Replication from 2001-2002 also reported no association between self-reported drug abuse problems and chronic spinal pain, in a US nationally-representative sample which included older adults.¹⁷ Only a fraction of illicit substance users, however, self-identify as having abuse problems, or have clinically documented addiction.¹⁵ It is also plausible that the prevalence of illicit drug use increased disproportionately in the chronic low back pain population compared to the general population over the past two decades. For example, a series of urine toxicology studies by Manchikanti et al. from the early 2000s showed a higher prevalence of illicit substance use in a pain management clinic setting, with 11% of urine samples positive for marijuana, over 6% positive for cocaine, and 3% positive for amphetamines in patients on stable doses of opioids, and 32% of urine specimens positive for illicit substances in patients seeking higher doses of opioids.^{18,19} Similarly, a 2008 large urine toxicology study from pain clinics in six states reported urine samples positive for marijuana in 8.9% of chronic pain patients, cocaine in 2.8%, and amphetamines in 1.5%.²⁰ The prevalence of opioids in the urine was

82% in this sample. These studies did not differentiate between chronic pain diagnoses and were not designed to compare drug use rates with the general population.

Our study's strengths include a large nationally representative sample, and private computer-based drug use questionnaire administration, that is less susceptible to reporting bias than other interviewing methods. However, this study has several limitations. NHANES is a cross-sectional survey, with many self-report variables that are subject to measurement error and recall bias. Temporal relationships and causality cannot be established from this study design, and, as with any observational study, residual confounding is likely present. Data collection was limited to subjects between 20 and 69 years of age, thus results should not be extrapolated on younger and older subjects. The study only included the non-institutionalized population, and may be undersampling populations at high-risk of illicit drug use.

The association between a history of illicit drug use and prescription opioid use in the cLBP population is consistent with previous studies,^{21,22} but may be confounded by other clinical conditions. Mental health disorders, for example, have been associated with both illicit substance use and prescription opioid use in the chronic low back pain population.^{23,24} In the context of management, however, illicit drug abuse is predictive of aberrant prescription opioid behaviors.^{7-10,25} As we face a prescription opioid addiction epidemic,²⁶ careful assessment of illicit drug use history may aid prescribing decisions.

Our study did not differentiate between recreational and medical marijuana use. With the expanding acceptance of marijuana use in the US, the relationship between prescription opioid use and marijuana may become more complex. While at the time of this survey 14 states had medical marijuana laws in place,²⁷ by 2015 the number of states with medical marijuana laws increased to 23.²⁸ Studies of medical marijuana for chronic low back pain remain limited, with low quality of evidence on effectiveness and adverse events.²⁹

Despite the limitations, our study offers insights into an important public health problem of drug abuse in the chronic low back pain population, and has the advantage of using a nationally-representative sample of community dwelling adults. Further evaluation of illicit drug use as a predictor in longitudinal studies of chronic low back pain will facilitate a deeper understanding of the relationships between pain, illicit substance use, and prescription opioid administration, and assist in the design of safe and sustainable interventions for patients with chronic pain.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

The device(s)/drug(s) is/are FDA-approved or approved by corresponding national agency for this indication.

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Figure 1. Adjusted Odds Ratios of illicit drug use by substance in US adult participants of the 2009-2010 NHANES back pain survey, ages 20-69

cLBP – chronic low back pain. AOR – adjusted odds ratio, adjusted for age, race, gender, education. CL – confidence limits. LCL – lower confidence limit. UCL – upper confidence limit. Meth. – methamphetamine. Current substance use was defined as at least one instance of use within the last 30 days. Blue squares indicate the adjusted odds ratio estimates, and red bars show the 95% confidence limits for each estimate. For every substance, the adjusted odds of lifetime and current use were above 1 in US adults with cLBP compared to those without. All estimates were statistically significant, except for current use of methamphetamine.

Figure 2. Prescription narcotic analgesic use in the cLBP subgroup (N = 700)

cLBP – chronic low back pain. Two subgroup analyses were performed within the cLBP group to determine whether lifetime and current illicit drug use were associated with prescription narcotic analgesic use. The analysis for lifetime substance use is shown on the left, and current substance use – on the right. The percentage of subjects with cLBP who reported use of illicit drugs is shown in red. The corresponding percentage of subjects with cLBP who did not use illicit drugs is shown in gray. Black error bars show the standard error. All estimates are weighted to represent the national population. The Chi-square P values for between-group comparisons are shown below for each substance. Subjects with cLBP who reported lifetime illicit drug use were more likely to have an active prescription for narcotic analgesics, than those cLBP sufferers who did not use illicit drugs (22.5% vs 15.3%, $p = 0.018$). Among current illicit drug users with cLBP, 25.7% had an active prescription for a narcotic analgesic vs 17.7% of current non-users with cLBP; this difference, however, was not statistically significant.

Table 1

Demographics: US adult participants of the 2009-2010 NHANES back pain survey, ages 20-69 (N = 5103).

	% Total (SE%)	% with cLBP (SE%)	% w/o cLBP (SE%)	P value
Age:				
20-29	21.7 (0.8)	15.1 (1.4)	22.7 (0.9)	<0.0001
30-39	20.4 (0.7)	18.3 (2.2)	20.7 (0.8)	
40-49	22.6 (0.8)	19.3 (2.3)	23.1 (0.8)	
50-59	20.9 (0.9)	27.4 (2.5)	19.9 (0.9)	
60-69	14.4 (0.5)	20.0 (1.5)	13.6 (0.5)	
Gender:				
Female	50.8 (0.7)	55.8 (2.6)	50.1 (0.7)	0.036
Race:				
Caucasian	66.2 (3.5)	74.9 (3.7)	64.9 (3.5)	<0.0001
African American	11.8 (0.9)	10.1 (1.4)	12.1 (0.9)	
Hispanic	14.5 (3.0)	11.9 (3.1)	14.9 (3.0)	
Other	7.5 (1.2)	3.1 (0.8)	8.1 (1.3)	
Education:				
College and higher	28.6 (1.3)	18.6 (2.6)	30.2 (1.5)	0.0001
GED/AA degree	53.6 (1.1)	60.9 (2.1)	52.5 (1.4)	
Less than High school	17.7 (0.8)	20.6 (1.2)	17.3 (0.9)	

cLBP – chronic low back pain. SE – standard error. GED – general educational development. AA – associate's. All estimates are weighted to represent the national population.

Table 2

Substance use in US adult participants of the 2009-2010 NHANES back pain survey, ages 20-69 (N = 5103).

	% Total (SE%)	% with cLBP (SE%)	% w/o cLBP (SE%)	P value	Adjusted OR (95% CI)	AOR P value
Lifetime illicit drug use	44.1 (1.7)	49.0 (2.5)	43.3 (1.8)	0.029	1.42 (1.12-1.79)	0.0035
Current illicit drug use	9.9 (0.9)	14.2 (2.0)	9.3 (0.9)	0.003	1.91 (1.34-2.73)	0.0004
Smoking status:						
Never	56.0 (1.9)	42.5 (2.6)	58.0 (2.0)	<0.0001	1 (Ref.)	0.0001
Former	21.7 (1.4)	27.1 (1.8)	20.9 (1.6)		1.44 (1.12-1.86)	
Current	22.3 (0.9)	30.4 (2.2)	21.1 (0.9)		1.77 (1.37-2.30)	
Alcohol use in the past year	70.9 (1.3)	74.4 (1.7)	70.3 (1.5)	0.040	1.21 (0.96-1.52)	0.114
Modified AUDIT-C: 4	21.1 (1.0)	20.3 (1.5)	21.2 (1.0)	0.472	1.06 (0.86-1.30)	0.568

SE – standard error. cLBP – chronic low back pain. AOR – adjusted odds ratio, adjusted for age, race, gender, education. CI – confidence interval. All estimates are weighted to represent the national population. Reference category not displayed for binary variables.

Table 3

Lifetime and current illicit drug use by substance among US adults with cLBP and without cLBP, ages 20-69 (N = 5103).

	% Total (SE%)	% with cLBP (SE%)	% w/o cLBP (SE%)	P value
Marijuana Lifetime	42.6 (1.7)	46.5 (2.6)	42.0 (1.8)	0.098
Cocaine Lifetime	15.0 (1.0)	21.9 (2.1)	13.9 (1.0)	<0.0001
Heroin Lifetime	2.4 (0.3)	5.0 (1.0)	2.1 (0.3)	0.0001
Meth. Lifetime	5.2 (0.5)	9.2 (1.3)	4.6 (0.6)	0.0005
Marijuana Current	9.3 (0.8)	13.2 (1.8)	8.7 (0.8)	0.005
Cocaine Current	1.3 (0.3)	2.1 (0.6)	1.2 (0.3)	0.018
Heroin Current	0.2 (0.1)	0.7 (0.4)	0.1 (0.1)	0.002
Meth. Current	0.1 (0.1)	0.3 (0.3)	0.1 (0.0)	0.093

SE – standard error. cLBP – chronic low back pain. All estimates are weighted to represent the national population.