Published in final edited form as:
Drug Alcohol Depend. 2006 February 28; 81(3): 259–265.

High prevalence of alcohol use among hepatitis C virus antibody positive injection drug users in three US cities

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Abstract

Injection drug users (IDUs) acquire the majority of new hepatitis C virus (HCV) infections and frequently use alcohol. Alcohol abuse accelerates liver disease among HCV-infected persons, can reduce the effectiveness of treatment for HCV infection and may be a contraindication for HCV treatment. HCV seropositive, HIV-negative IDUs aged 18–35 years in Baltimore, New York City and Seattle who were enrolled in a behavioral risk-reduction intervention trial underwent computerized self-interviews to assess baseline alcohol use and dependence and medical history. We measured problem alcohol use using the 10-item Alcohol Use Disorders Identification Test (AUDIT) scale. Of 598 participants, 84% responded “false” to: “it is safe for a person with HCV to drink alcohol”. Problem drinking, defined as score ≥ 8 on AUDIT, was identified in 37%. Correlates of scoring ≥ 8 on AUDIT included homelessness, male gender, primarily injecting speedballs, having injected with used needles, prior alcohol treatment and depression. Although most HCV seropositive IDUs in our sample appear informed about their increased risk of liver disease from alcohol, two-fifths screened positive for problem alcohol use. These findings underscore the importance of referring HCV-positive persons to effective alcohol treatment programs to reduce future liver damage and improve eligibility for and effectiveness of treatment of HCV.

Keywords

Alcohol; Hepatitis C virus; Injection drug users

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1. Introduction

Alcohol use is common among injection drug users (IDUs), and contributes to adverse drinking consequences such as social, physical and economic problems and risky behaviors such as needle sharing (Anderson et al., 2001; Stein et al., 2000). Heavy alcohol consumption by persons infected with hepatitis C virus (HCV) can increase the risk of progression of liver fibrosis, to cirrhosis and end-stage liver disease (Poynard et al., 1997; Wiley et al., 1998; Thomas et al., 2000), and diminishes the effectiveness of HCV treatment (Peters and Terrault, 2002; Jamal and Morgan, 2003). The National Institutes of Health (NIH) 2002 Consensus Statement for Management of HCV infection strongly recommends alcohol abstinence during HCV treatment, noting the need for concurrent diagnosis and treatment of alcohol abuse or dependence (NIH, 2002). While previous research on alcohol and HCV have focused on heavy consumption, there is increasing interest in understanding the effect of moderate alcohol consumption on HCV progression given its potential to interfere with the effectiveness of HCV treatment.

Because the annual incidence rate of HCV infection is 10–20% among many urban populations of IDUs (Garfein et al., 1998; Hagan et al., 1999) and 68% of newly acquired HCV infections in the United States are associated with injection drug use (Alter, 2002), addressing alcohol use among this population is important for slowing disease progression, increasing the effectiveness of HCV treatment and potentially reducing the risk of transmitting HCV to other injectors. Further, because young IDUs are more likely to practice high-risk injection (Becker Buxton et al., 2004) and drinking behaviors (SAMHSA, 2001), the adoption of harm reduction strategies by young IDUs may be particularly important in decreasing HCV transmission and HIV infection and reducing the risk of liver damage. This paper describes the prevalence of, treatment history for, and risk awareness of alcohol use among young HCV seropositive IDUs in Baltimore, New York City and Seattle. We also describe factors associated with problem alcohol use to help identify those for whom alcohol treatment may be needed to increase eligibility for and success of treatment of HCV. Finally, we compare two alcohol screening tools not previously contrasted in an injection drug-using population.

2. Methods

The Study to Reduce Intravenous Exposures (STRIVE) is a longitudinal randomized control trial of a behavioral intervention to reduce high-risk transmission behaviors and increase health care utilization among young HCV antibody positive IDUs. Between June 2002 and May 2004, the study enrolled HCV seropositive, HIV-negative IDUs aged 18–35 years from Baltimore, MD, New York City, NY and Seattle, WA. Participants were initially recruited into a multi-site HIV/HCV prevention study or other local HIV/HCV studies (in Seattle and New York) through street and agency outreach, targeted advertising and referrals from peers. Participants ineligible to continue in those studies due to their HCV-positive serostatus were invited to take part in STRIVE and gave written informed consent to enroll. Participants completed two audio computer-administered self-interviews over two visits. The first interview, conducted prior to HCV antibody testing and counseling, collected demographic characteristics, injection risk behaviors during the past 3 months, and psychosocial characteristics including self-esteem. The second interview, completed at least 3 days after participants received HCV post-test counseling, assessed alcohol use and dependence, knowledge about consequences of alcohol use in HCV-infected persons, and HCV-related medical history and other conditions, including depressive symptoms. After the second interview, blood specimens were collected and tested for liver function and the presence of HCV-RNA; however, because the results were unknown at the time alcohol use was reported, they were not exclusion criteria for this analysis. More detailed recruitment and enrollment methods have been previously published (Golub et al., 2004). This analysis presents baseline data from the two interviews described.

Problem drinking was evaluated with the 10-item Alcohol Use Disorders Identification Test (AUDIT). AUDIT is a screening tool developed by the World Health Organization for identification of milder stages of problem drinking than alcoholism; a cut-off of ≥ 8 is used to detect hazardous or harmful alcohol consumption (Saunders et al., 1993; Fiellin et al., 2000). The AUDIT assessment is the preferred tool for HCV-infected populations (Sylvestre et al., 2004) and has been validated with drug users (Skipsey et al., 1997). AUDIT collects data on quantity and frequency of consumption, as well as alcohol-related behaviors and problems, within the past year. We also calculated weekly alcohol consumption using the first two AUDIT questions ("How often do you have a drink containing alcohol" and "How many drinks containing alcohol do you have on a typical day when you are drinking") and used National Institute on Alcohol Abuse and Alcoholism (NIAAA) guidelines for defining "at risk" alcohol use as more than 14 drinks per week for males and more than 7 drinks a week for females and "moderate" use as anything below "at risk" use (NIAAA, 1995).

Scores on the four-item CAGE scale are also presented. CAGE screens for lifetime alcoholism and is an acronym for the four questions in the scale: "Have you ever felt you ought to Cut down on your drinking", "Have people ever Annoyed you by criticizing your drinking", "Have you ever felt bad or Guilty about your drinking" and "Have you ever had a drink first thing in the morning to steady your nerves, to get rid of a hangover, or as an Eye-opener" (Ewing, 1984). Questions 3 and 4 are similar to AUDIT questions. Problem drinking on the CAGE scale was defined as answering yes to at least one item. Some debate exists about the appropriate cut-off for CAGE (Mayfield et al., 1974; Fiellin et al., 2000); however, given the potential seriousness of even moderate alcohol use among individuals with hepatitis C, we used the lower threshold in defining problem drinking. To our knowledge, this scale has not been validated with injection drug users.

To explore the effect of underlying psychological factors on risk of alcohol consumption problems in participants, we measured depression using the Beck Depression Inventory (BDI) (Beck et al., 1961) with a cut-off of ≥ 19 to detect moderate to severe levels of depression (Joe et al., 1991), and self-esteem using the Rosenberg Self-Esteem Scale (Rosenberg, 1965).

Univariate analyses of factors expected, based on previous alcohol research, to be associated with alcohol consumption and AUDIT score ≥ 8 were performed using Chi-square tests, *t*-tests, and Wilcoxon Rank Sums. The AUDIT and CAGE scales were compared with McNemar's test. Multivariate logistic regression analysis was used to determine characteristics independently associated with screening positive for problem drinking on AUDIT. The initial model included characteristics significantly associated with AUDIT at the $\alpha = 0.05$ level in univariate analysis. The final regression model, controlling for study site, included only significant variables remaining in the initial regression model. The Breslow-Day test for homogeneity was used to examine whether study site acted as an effect modifier in these relationships. Analysis was conducted using SAS Version 8.02 (SAS Institute Inc., Cary, NC). This study was approved by Institutional Review Boards at Johns Hopkins Bloomberg School of Public Health (Committee on Human Research), The University of Washington and The New York Academy of Medicine.

3. Results

There were 598 participants who enrolled in the study and provided baseline questionnaire data for AUDIT. The median age was 26 years (interquartile range, IQR: 23–29), 60% were white and 77% were male. Over half (57%) had been homeless in the last 6 months and 82% had ever spent time in jail, prison or juvenile detention (Table 1). The median age at first injection was 19 (IQR: 17–22) and the median number of years since initiating injection was 6 (IQR: 4–9).

About one-quarter of participants (27%) reported no alcohol use, 62% reported moderate use and 11% had "at risk" use (more than 14 drinks per week for males and more than 7 drinks a week for females; Table 1). Participants who drank alcohol ($n = 430$) consumed a median of 2 (IQR: 0.9–8.8) drinks per week, with males and females reporting a median of 3.5 (IQR: 0.9–8.8) and 0.9 (IQR: 0.4–5.5) drinks per week, respectively. "At risk" drinkers ($n = 65$) consumed a median of 22 (IQR: 20–32) drinks per week, 25 (IQR: 22–32) for males and 14 (IQR: 8.8–20) for females.

About 40% of participants had received treatment for alcohol use, including Alcoholics Anonymous, in their lifetime. Participants who had ever been in treatment had significantly higher median alcohol consumption than those never in treatment (1.5 drinks versus 0.4 drinks per week, $p < 0.01$). Fourteen percent of participants had ever been told by a health care provider that they have a problem with alcoholism (data not shown).

Prior to HCV testing for study eligibility and enrollment, 79% of participants had been tested for HCV antibody at least once. The most common setting for prior testing was a previous research study (37%), followed by private doctor/health department/hospital (26%), drug treatment (19%) and jail (10%). Of participants who received their first positive HCV antibody test result from a clinical setting, 81% were counseled to reduce alcohol use; participants were most likely to receive this counseling in research settings (87%) and least likely in jails (62%). Including those not previously tested, the current research studies provided the first positive HCV antibody test result for 47%. The majority of participants (84%) recognized as "false" the statement: "it is safe for a person with hepatitis C to drink alcohol" and 84% chose "stop drinking alcohol" as most important from a list of things people with HCV can do for their health. For the 300 who had tested HCV seropositive prior to study enrollment, the median time since learning of their positive serostatus was 25 months (IQR: 6–49).

3.1. Correlates of problem drinking

Over one-third (37%) of participants were identified as problem drinkers by AUDIT. Participants more likely to score ≥ 8 on AUDIT include those from New York, of Hispanic ethnicity, and males (Table 1). Problem drinking was also associated with homelessness in the past 6 months and having ever been incarcerated. Length of time since the first positive HCV antibody test was not related to problem drinking, nor was perceived HCV status prior to study enrollment. Injection characteristics associated with problem drinking included first injecting at an earlier age, usually injecting speedballs (combined heroin and cocaine) or cocaine/crack, and having injected with used needles in the past 3 months. Problem drinkers were more likely to have received previous treatment for alcohol use but not for drug use, and were more likely to report depressive symptoms. Problem drinking was not associated with self-esteem nor with belief about the harmful effects of drinking for people infected with HCV. These univariate results did not change when the sample was restricted to those with positive HCV-RNA results.

Factors independently associated with problem drinking in the final multivariate model (Table 2) included male sex (adjusted odds ratio, AOR = 2.5; 95% confidence interval, CI = 1.5–4.3), homelessness (AOR = 1.6, 95% CI = 1.1–2.5), injecting with used needles in the past 3 months (AOR = 2.0, 95% CI = 1.3–3.1), prior alcohol treatment (AOR = 3.7, 95% CI = 2.4–5.7) and depression (AOR = 1.7, 95% CI = 1.1–2.6). In comparison with heroin users, those who primarily injected speedballs were more likely to be problem drinkers (AOR = 1.7, 95% CI = 1.03–2.7).

3.2. Comparison of CAGE and AUDIT

The CAGE scale identified 54% of participants as having a drinking problem in their lifetime. One-third of participants were identified by both AUDIT and CAGE as suspected of problem

drinking and 41% were identified by both scales as not having a drinking problem. However, results from these scales were not significantly associated using McNemar's test of correlated proportions. The first CAGE item, "Have you ever felt you ought to cut down on your drinking" was the most commonly selected: of the 113 CAGE-positive/AUDIT-negative participants, 81% responded affirmatively. Of participants reporting no alcohol consumption, AUDIT detected 7% as having a problem with alcohol while CAGE identified 32%, mainly due to the item regarding "ever felt you ought to cut down". Even after increasing the CAGE cut-off to ≥ 2, 20% of those reporting zero consumption still screened positive for alcohol abuse.

4. Discussion

The HCV seropositive drug injectors in this multi-site study had a high level of awareness about the detrimental effects of alcohol consumption related to HCV infection. However, over three-quarters consumed at least moderate amounts of alcohol and two-fifths were identified as harmful drinkers by the AUDIT screening tool. Furthermore, knowledge about alcohol did not appear to influence alcohol use, with problem drinkers reporting similar levels of awareness as those without a drinking problem. The level of moderate drinking we observed was higher than that found in past studies of IDUs where the HCV serostatus was unknown (Stein et al., 2000), although the low median level of consumption indicates that the majority of those who drink are consuming fairly small quantities or are not drinking frequently. In this sample of HCV seropositive IDUs, problem drinkers tended to be males with a history of alcohol treatment who reported symptoms of depression. Many of those who had ever received treatment for alcohol use were still identified as problem drinkers and consumed larger quantities of alcohol compared to their peers. As found with other populations (Bradley et al., 2004), our findings suggest that alcohol treatment history can be a tool to help identify harmful drinking by IDUs. Similarly, the association between depression and alcohol is not unique to this population—these conditions frequently co-occur and are often comorbid with polysubstance use (Grant and Harford, 1995; Staines et al., 2001; Ross et al., 1988). Other characteristics related to a more risky or marginalized lifestyle were also independently associated with screening positive for problem drinking, including homelessness, speedball use and injecting with used needles (Garfein et al., 1998; Malow et al., 1992).

Recall of alcohol counseling upon first positive HCV antibody test was high, including results given in clinical settings. In this circumstance, CAGE may be over-detecting harmful drinking or may be identifying past rather than current problems. Among this HCV seropositive population who are knowledgeable about the detrimental effects of alcohol use, CAGE may detect guilty feelings about lifetime rather than current use while AUDIT assesses more recent consumption. Furthermore, the quantity and frequency questions from AUDIT may allow for greater precision, particularly in a clinical setting. In light of NIH recommendations for alcohol abstinence before antiviral therapy and the possible damaging effects of even low consumption, these results support the use of AUDIT for this HCV seropositive IDU population.

The results of this analysis may be limited in their application to populations not represented in our study sample, in particular Black IDUs or those in other cities or rural areas. The use of the original phrasing of the AUDIT quantity and frequency questions, which do not specify a time frame, likely provided us a measure of current consumption rather than in the last year. This could have underestimated drinking among our newly diagnosed and recently counseled participants who have quit temporarily and are at risk of relapse. Additional probing in a clinical setting, as AUDIT was originally designed, or specifying the time frame could overcome this potential problem. Balancing this limitation is the possibility that administration by ACASI lessened socially desirable self-reporting (Perlis et al., 2004) and provided a more accurate estimate of drinking levels.

Our data indicate that moderate to risky alcohol consumption is highly prevalent among younger HCV seropositive IDUs. It is important to identify and treat this problem drinking for several reasons. Because alcohol use has been shown to accelerate liver damage among persons infected with HCV (Poynard et al., 1997; Wiley et al., 1998; Thomas et al., 2000), problem drinking by young IDUs should be addressed before liver disease has progressed. Further, with consideration of recent recommendations by Schaefer et al. (2004) that HCV treatment not be limited by active injection drug use or depression, heavy, untreatable alcohol use may soon be considered one of the few significant contraindications to treatment for HCV. Finally, if alcohol use is more than a mere marker for high-risk behavior and, in fact, contributes to unsafe injection practices (Matos et al., 2004; Stein et al., 2000), addressing alcohol use in this young IDU population may have the added benefit of decreasing HCV transmission.

Approaches to eliminate drinking in this population need to address underlying reasons for continued alcohol use and not simply increase awareness of its consequences, as there is a clear disconnect between knowledge and drinking behavior. Interventions to reduce problem drinking may have even greater success if injection risk-reduction counseling, assistance to obtain stable housing, and treatment of depression can be included in a comprehensive program such as prevention case management (CDC, 1997). The NIH (2002) Consensus Statement on Management of HCV encourages increasing the availability of current treatments to injection drug users and to those with a history of alcohol abuse and promotes further research into the effects of moderate alcohol levels on disease progression and treatment effectiveness (Edlin, 2002; Peters and Terrault, 2002; NIH, 2002). The findings of this analysis support these guidelines and highlight the need for accurately assessing and effectively addressing problem drinking as well as moderate alcohol consumption among IDUs.

Acknowledgements

The authors would like to acknowledge the contributions of Hanne Thiede, the STRIVE team and especially all STRIVE study participants.

Financial support: Funding for this project was provided through a cooperative agreement from the National Institute on Drug Abuse (DA14499).

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Table 1

Demographic and injection characteristics of HCV seropositive, HIV-negative injection drug users in the STRIVE study and their associations with problem drinking (AUDIT ≥ 8), June 2002–May 2004

	Total (*n* = 598) *n* (Column %)	AUDIT <8 (*n* = 374) *n* (Row %)	AUDIT ≥ 8 (*n* = 224) *n* (Row %)	χ^2 *p*-Value
Demographic characteristics				
Study site				.03
Baltimore	296 (49.5)	199 (67.2)	97 (32.8)	
New York City	160 (26.8)	87 (54.4)	73 (45.6)	
Seattle	142 (23.7)	88 (62.0)	54 (38.0)	
Age (years)				NS
18–22	99 (16.6)	64 (64.6)	35 (35.4)	
23–28	331 (55.3)	210 (63.4)	121 (36.6)	
29–35	168 (28.1)	100 (59.5)	68 (40.5)	
Race/ethnicity				.01
Hispanic	143 (23.9)	76 (53.1)	67 (46.9)	
Black	32 (5.3)	26 (81.2)	6 (18.8)	
White	361 (60.4)	235 (65.1)	126 (34.9)	
Other	62 (10.4)	37 (59.7)	25 (40.3)	
Gender				<.01
Male	456 (77.0)	269 (59.0)	187 (41.0)	
Female	136 (23.0)	101 (74.3)	35 (25.7)	
Homeless (past 6 months)				<.01
No	251 (42.6)	178 (70.9)	73 (29.1)	
Yes	338 (57.4)	191 (56.5)	147 (43.5)	
Incarcerated (ever)				<.01
No	105 (17.7)	82 (78.1)	23 (21.9)	
Yes	487 (82.3)	288 (59.1)	199 (40.9)	
Education				NS
≤ 11th grade	269 (45.5)	162 (60.2)	107 (39.8)	
HS grad/GED	322 (54.5)	207 (64.3)	115 (35.7)	
Time since first positive HCV test				NS
0–6 months	271 (50.1)	170 (62.7)	101 (37.3)	
7–36 months	150 (27.7)	97 (64.7)	53 (35.3)	
>37 months	120 (22.2)	71 (59.2)	49 (40.8)	
Perceived HCV status				NS
Positive	300 (53.0)	193 (64.3)	107 (35.7)	
Negative	266 (47.0)	164 (61.7)	102 (38.3)	
Drug use characteristics				
Age at first injection				<.01
<19	289 (48.8)	164 (56.8)	125 (43.2)	
≥19	303 (51.2)	206 (68.0)	97 (32.0)	
Years since first injection				NS
0–6	293 (50.4)	191 (65.2)	102 (34.8)	
>6	288 (49.6)	171 (59.4)	117 (40.6)	
Injection frequency				NS
Less than daily	209 (36.0)	131 (62.7)	78 (37.3)	
Daily	371 (64.0)	230 (62.0)	141 (38.0)	
Primary drug injected				<.01
Heroin	351 (61.2)	236 (67.2)	115 (32.8)	
Speedball	166 (28.9)	85 (51.2)	81 (48.8)	
Cocaine/crack	34 (5.9)	18 (52.9)	16 (47.1)	
Amphetamine/other	23 (4.0)	17 (73.9)	6 (26.1)	
Injected with used needles				<.01
No	212 (39.5)	157 (74.1)	55 (25.9)	
Yes	325 (60.5)	174 (53.5)	151 (46.5)	
Drug treatment (ever)				NS
No	183 (31.0)	122 (66.7)	61 (33.3)	
Yes	408 (69.0)	248 (60.8)	160 (39.2)	
Alcohol use characteristics				
Alcohol consumption[a]				<.01
None	162 (27.4)	150 (92.6)	12 (7.4)	
Moderate	365 (61.7)	219 (60.0)	146 (40.0)	
At risk	65 (11.0)	1 (1.5)	64 (98.5)	
Alcohol treatment (ever)				<.01
No	361 (60.9)	263 (72.9)	98 (27.1)	
Yes	232 (39.1)	109 (47.0)	123 (53.0)	
CAGE ≥ 1[a]				<.01
No	257 (46.5)	227 (88.3)	30 (11.7)	
Yes	296 (53.5)	113 (38.2)	183 (61.8)	
Psychosocial/knowledge characteristics				
Beck Depression Inventory				<.01
<19	310 (56.8)	212 (68.4)	98 (31.6)	

	Total (n = 598) n (Column %)	AUDIT <8 (n = 374) n (Row %)	AUDIT ≥ 8 (n = 224) n (Row %)	χ^2 p-Value
≥ 19	236 (43.2)	128 (54.2)	108 (45.8)	
Self-esteem				NS
1 Lower self-esteem	3 (0.5)	2 (66.7)	1 (33.3)	
2	176 (30.5)	96 (54.5)	80 (45.5)	
3	356 (61.8)	231 (64.9)	125 (35.1)	
4 Higher self-esteem	41 (7.1)	29 (70.7)	12 (29.3)	
"It is safe for a person with hepatitis C to drink alcohol"				NS
True	497 (83.9)	304 (61.2)	193 (38.8)	
False	59 (10.0)	38 (64.4)	21 (35.6)	
Do not know	36 (6.1)	28 (77.8)	8 (22.2)	

Note: Injection risks are in the past 3 months. HCV, hepatitis C virus; HIV, human immunodeficiency virus; AUDIT, Alcohol Use Disorders Identification Test; CAGE, alcoholism screening tool acronym.

[a] Variables not included in multivariate analysis; subset of AUDIT or colinear.

Table 2

Characteristics independently associated with problem drinking (AUDIT ≥ 8) among HCV seropositive, HIV-negative injection drug users in the STRIVE study, June 2002–May 2004

	Unadjusted odds ratio (95% confidence interval)	Adjusted odds ratio (95% confidence interval)
Study site		
Baltimore	Ref.	Ref.
New York City	1.7 (1.2–2.6)	1.4 (0.8–2.4)
Seattle	1.3 (0.8–1.9)	0.9 (0.5–1.6)
Gender		
Male	2.0 (1.3–3.1)	2.5 (1.5–4.3)
Female	Ref.	Ref.
Homeless (past 6 months)		
No	Ref.	Ref.
Yes	1.9 (1.3–2.7)	1.6 (1.1–2.5)
Primary drug injected		
Heroin	Ref.	Ref.
Speedball	2.0 (1.3–2.9)	1.7 (1.03–2.7)
Cocaine/crack	1.8 (0.9–3.7)	2.0 (0.8–4.8)
Amphetamine/other	0.7 (0.3–1.9)	0.6 (0.2–1.9)
Injected with used needles		
No	Ref.	Ref.
Yes	2.5 (1.7–3.6)	2.0 (1.3–3.1)
Alcohol treatment (ever)		
No	Ref.	Ref.
Yes	3.0 (2.1–4.3)	3.7 (2.4–5.7)
Beck Depression Inventory		
<19	Ref.	Ref.
≥ 19	1.8 (1.3–2.6)	1.7 (1.1–2.6)

Note: Injection risks are in the past 3 months. HCV, hepatitis C virus; HIV, human immunodeficiency virus; AUDIT, Alcohol Use Disorders Identification Test.