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ORIGINAL PAPER

Substance Use Patterns of HIV-Infected Russian Women with and Without Hepatitis C Virus Co-infection

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Abstract Individuals with HIV and hepatitis C virus (HCV) co-infection may experience substance use related health complications. This study characterized substance use patterns between HIV/HCV co-infected and HIV mono-infected Russian women. HIV-infected women ($N = 247$; M age = 30.0) in St. Petersburg, Russia, completed a survey assessing substance use, problematic substance use, and the co-occurrence of substance use and sexual behaviors. Covariate adjusted logistic and linear regression analyses indicated that HIV/HCV co-infected participants (57.1 %) reported more lifetime drug use (e.g., heroin: AOR: 13.2, 95 % CI 4.9, 35.3, $p < .001$), problem drinking ($\beta = 1.2$, $p = .05$), substance use problems ($\beta = 1.3$, $p = .009$), and increased likelihood of past injection drug use (AOR: 26.4, 95 % CI 8.5, 81.9, $p < .001$) relative to HIV mono-infected individuals. HIV/HCV co-infection was prevalent and associated with increased substance use and problematic drug use. Findings highlight the need for ongoing substance use and HIV/HCV risk behavior assessment and treatment among HIV/HCV co-infected Russian women.

Keywords HIV-infected · HCV · Russian women · Substance use · Problematic substance use

Introduction

As of 2014, there are approximately 980,000 people living in Russia with the human immunodeficiency virus (HIV) with a prevalence rate exceeding 1 % and incident HIV infections on the rise among Russian women [1–3]. HIV and hepatitis C virus (HCV) often co-occur; an estimated 16–33 % of HIV-infected individuals are HCV co-infected [4–7]. However, among some populations, such as HIV-infected individuals with an injection drug use (IDU) history, HCV co-infection prevalence has been estimated to be as high as 80–88 % [4, 8]. Estimates suggest between 250 and 500 million people globally are infected with HCV with a worldwide prevalence rate of 2–3 % [4, 9]. Engaging in specific drug use behaviors including IDU or sharing needles and other injection paraphernalia (e.g., cottons, cookers) increases the risk of both HCV and HIV transmission [10]. For example, among Russian injection drug users in four cities, between 54 and 70 % were HCV positive [11]. Substance use is also associated with increased risk behavior engagement including trading sex for money or drugs [12–14], multiple or concurrent sexual partners [15–17], or inconsistent condom use [16, 18], behaviors that increase HCV and HIV transmission risk.

Among individuals exposed to HCV with a reactive HCV antibody test, approximately 85 % will develop chronic

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HCV [19]. Chronic HCV is the leading cause of liver disease, cirrhosis, and need for a liver transplant [9]. HIV/HCV co-infected individuals develop liver diseases (e.g., hepatocellular carcinoma) earlier and more severely than mono-infected individuals [7, 9]. Alcohol use among individuals with HCV further accelerates liver damage (e.g., steatosis, cirrhosis) and disease progression [9, 20, 21]. While estimates vary, it has been estimated that as many as 50 % of HIV/HCV co-infected individuals consume alcohol [9]. There is no consensus regarding safe levels of alcohol use among HCV-infected individuals [22, 23] and current recommendations are for individuals with HCV to abstain from alcohol use [9]. However, HCV-infected individuals may engage in elevated rates of problem drinking; one study found that 41 % of HCV-infected individuals engaged in problem drinking as measured by the Alcohol Use Disorders Identification Test (AUDIT; [22]). Problem drinking has also been associated with decreased HCV treatment engagement [21] and may adversely affect HCV [20, 24] and HIV treatment outcomes [7].

Alcohol abuse or dependence has been identified as a factor contributing to sex- and drug-risk behaviors among HIV-infected individuals in Russia [25]. Elevated rates of hazardous drinking have been found among cohorts of HIV-infected individuals [25] and HIV-uninfected women [26, 27] in Russia. The WHO estimates that 5.8 % of all Russian women are heavy episodic drinkers (defined as drinking $\geq$60 g of pure alcohol on one or more occasions during a 7 day period) and 2.6 % have an alcohol use disorder [26]. Alcohol use is a prominent factor correlated with HIV-risk behavior [28–32] broadly, and within Russia, specifically [25, 33–35]. Substance use in Russia, particularly among women with an IDU history, has also been associated with increased HIV and HCV risk behaviors including unprotected sex, greater number of sexual partners, and sharing needles [36]. Additionally, opposition to substance use harm reduction strategies including syringe exchange programs [37] and drug treatment approaches including opioid substitution [38] may also increase risk for HCV and HIV within Russia.

Despite the health risks of alcohol and other substance use among HIV/HCV co-infected individuals and potential for transmission of both HIV and HCV, there is a paucity of research examining patterns of substance use between those with HIV/HCV co-infection relative to HIV mono-infected individuals. To date, the existing literature has focused on patterns of substance use between those with and without HCV, particularly among IDU populations [22, 39–41] or those engaged in substance use treatment (e.g., opioid substitution treatment; [23, 42–47]). For example, Willner-Reid et al. compared the substance use and HIV risk behaviors between HCV-infected and HCV-uninfected individuals engaged in methadone maintenance treatment. Results indicated few differences with regards to demographic characteristics (e.g., age, gender, marital status, etc.), psychiatric diagnoses, or number of days of alcohol or drug use in the past month [48]. However, HCV-infected individuals reported more years of heroin, cocaine, and polydrug use, increased likelihood of IDU, and greater engagement in HIV risk behaviors (e.g., condomless sex, increased number of sexual partners; [48]). While this study highlights potential differences in risk behavior engagement between HCV-infected and uninfected cohorts, there is a lack of data examining substance use patterns among HIV-infected individuals with and without HCV co-infection. Thus, understanding the substance use patterns and the association between substance use and sexual risk behaviors among HIV mono-infected and HIV/HCV co-infected individuals is an urgent public health priority, particularly among Russian women.

HIV and HCV prevalence are increasing in Russia, a country with high prevalence of alcohol use, problematic drinking, and other substance use. The aims of the current study were to: (a) assess the prevalence of HIV and HCV co-infection among a sample of HIV-infected women receiving HIV medical care in St. Petersburg, Russia; and (b) compare patterns of substance use, the co-occurrence of alcohol use and sexual behaviors, and alcohol sex-related outcome expectancies between HIV/HCV co-infected individuals relative to individuals with only HIV.

Methods

Participants

Participants were HIV-infected women ($N = 250$) receiving HIV medical care in Saint Petersburg, Russia. Analyses are limited to participants with documentation regarding their HCV antibody status included in their medical charts ($N = 247$; 98.8 % of total sample). Participants were between the ages of 19 and 35 years old with mean (SD) age of 30.0 (3.0); 43.3 % were married and 61.5 % were currently employed.

Procedures

A convenience sample of participants was recruited during patients' regularly scheduled medical appointments at a comprehensive HIV care center in Saint Petersburg, Russia. A study staff member approached female patients in the clinic, described the study, and assessed eligibility. Eligibility criteria included: (a) 18–35 years old; (b) report vaginal sex in the previous 3 months; (c) not pregnant; and (d) currently prescribed antiretroviral medication. Baseline data collection consisted of a 45-min survey administered

via an audio computer assisted self-interview (ACASI). Participants also provided biological specimens to test for prevalent STI, HIV viral load, CD4 counts, antiretroviral drug concentration levels, and recent alcohol use. All measures were translated from English to Russian and back translated from Russian to English. A pilot study was conducted to refine the measures prior to baseline data collection. Written informed consent was obtained from all participants. The Institutional Review Boards of the participating institutions approved all study procedures.

Descriptive Measures/Control Variables

Demographic Characteristics

Participants reported their age, marital status, and current employment status (not employed, employed).

HIV Medical Status Information

Participants self-reported the length of time since their HIV diagnosis. Participants' most recent viral load status (undetectable: <50 copies/mL, detectable: >50 copies/mL) was abstracted from their medical chart.

HCV Co-infection Status

HCV Antibody Status

Participants' medical charts were abstracted to obtain their HCV antibody status. Research staff recorded whether the participant had a documented reactive HCV antibody result or not.

Problematic Substance Use

Alcohol Use Disorders Inventory Test (AUDIT)

Problem alcohol use was assessed with the Alcohol Use Disorders Inventory Test (AUDIT; [49]). This 10-item questionnaire is a validated screening instrument to identify individuals who are at risk for problem drinking or who are already experiencing such problems [49]. The measure includes items concerning the frequency and amount of alcohol that is typically consumed. Additionally, questions assess the extent to which individuals have experienced possible consequences of problem drinking (e.g., injured self or others, failure to meet expectations). Summary scores range from 0 to 40, with a cut-off score of eight or higher being indicative of problem drinking. This measure has been shown to have a 1 month test–retest reliability of $r = .84$ in a general population sample [50].

Drug Abuse Screening Test (DAST)

The Drug Abuse Screening Test (DAST) assessed problematic drug use during the past year [51]. The DAST is a 10-item measure to assess drug use and potential negative consequences from drug use (e.g., neglected your family because of your use of drugs). For each item, participants selected "yes" or "no" and a total score for each affirmative response was calculated, with some items reverse scored. Higher scores are suggestive of a greater number of drug related problems. Among a sample of substance users, the scale was found to have a unidimensional factor structure with excellent internal consistency ($\alpha = .92$; [52]).

Lifetime Substance Use History

Lifetime Substance Use and Substance Use Treatment History

Participants reported whether they had ever injected drugs; those who reported injection drug use were asked if they had ever shared needles. Participants indicated whether they had ever smoked cigarettes (yes/no). Participants indicated whether they had ever used any illicit substances (yes/no). Those indicating past illicit substance use then reported whether they had used the following substances in their lifetime: (a) cocaine/crack; (b) ecstasy; (c) ephedrone; (d) hallucinogens; (e) heroin; (f) marijuana; (g) methadone; (h) speed/uppers or methamphetamine; and (i) pervitin. Additionally, participants indicated whether they had ever received substance use treatment (yes/no).

Recent Substance Use

Cigarette Use: Past Month

Participants reporting a lifetime history of cigarette use reported the number of days in the past month that they smoked cigarettes and the average number of cigarettes smoked per day.

Alcohol Use: Past Month

Participants reported on alcohol use during the past month including: (a) the number of days where at least one alcoholic drink was consumed; (b) the number of drinks consumed on an average day; and (c) the number of days drinking four or more drinks on one occasion.

Alcohol Use and Sexual Activity

Alcohol Use During the Most Recent Sexual Encounter

Participants indicated the number of alcoholic drinks they consumed immediately prior to or during their most recent sexual encounter; responses were dichotomized to indicate whether or not they consumed any alcohol.

Alcohol Sex-Related Outcome Expectancies

Participants reported on their expectancies regarding the effect of alcohol on sexual behaviors [53]. Participants responded to four items indicating their agreement with statements regarding the effects of alcohol on sex (e.g., "If I were under the influence from drinking alcohol I would enjoy sex more.") on a four-point scale from Disagree to Agree. A total score was calculated such that higher scores indicate greater expectancies that alcohol affects sexual behaviors.

Data Analytic Approach

Statistical analyses were performed using IBM SPSS version 23.0 [54]. Descriptive statistics were calculated to describe participant demographics, HIV medical status information, and HCV prevalence. Separate χ^2 and t test analyses were conducted to examine bivariate associations between HCV co-infection status and demographic characteristics and HIV medical status variables. Unadjusted logistic and linear regression models examined differences in substance use, the co-occurrence of alcohol use and sexual behaviors, and alcohol sex-related outcome expectancies between HIV mono-infected and HIV/HCV co-infected individuals. Covariate adjusted multivariable logistic and linear regression analyses then compared HIV/HCV co-infected participants' patterns of substance use, the co-occurrence of alcohol use and sexual behaviors, and alcohol sex-related outcome expectancies to those only infected with HIV, controlling for significant demographic and HIV medical status variables. Demographic and HIV medical status variables significant at $p \leq .10$ in bivariate analyses were entered as covariates in the adjusted multivariable logistic regression models examining substance use patterns between HIV/HCV co-infected and HIV mono-infected individuals.

Results

Sample Characteristics and Descriptive Statistics

More than half of the sample (57.1 %) was HIV/HCV co-infected. Participants' demographic and HIV medical status variables are presented in Table 1. Patients were diagnosed with HIV between <1 year ago and 18 years ago (M = 7.1, SD = 4.1). Approximately three-quarters (73.3 %) of participants' most recent viral load was undetectable according to their medical record. Individuals with HIV/HCV co-infection were older, less likely to be employed, less likely to be married, and were diagnosed with HIV for a longer period of time (all $p's < .10$). Table 2 presents descriptive statistics and unadjusted logistic and linear regression analyses examining substance use patterns, the co-occurrence of alcohol use and sexual behaviors, and alcohol sex-related outcome expectancies for HIV mono-infected individuals, HIV/HCV co-infected individuals, and the full sample.

Problematic Substance Use

Table 3 presents covariate-adjusted (controlling for age, marital status, employment status, and number of years HIV-infected) logistic and linear multivariable regression analyses examining substance use patterns, the co-occurrence of alcohol use and sexual behaviors, and alcohol sex-related outcome expectancies between HIV mono-infected and HIV/HCV co-infected individuals. HIV/HCV co-infected individuals had higher AUDIT total scores and were more likely to have AUDIT scores above the cut-off suggestive of problematic alcohol use. HIV/HCV co-infected individuals also had higher DAST scores indicating potential problematic drug use.

Lifetime Substance Use History

Those with HIV/HCV co-infection were more likely to report a lifetime history of: (a) cigarette use; (b) any illicit substance use; (c) injection drug use; (d) sharing needles; (e) ephedrone use; (f) hallucinogen use; (g) heroin use; (h) methadone use; and (i) pervitin use. There were no differences between HIV mono-infected and HIV/HCV co-infected individuals for lifetime use of cocaine/crack, ecstasy, marijuana, or speed/uppers, methamphetamine use.

Recent Substance Use

With regards to alcohol use in the past month, there were no differences between HIV mono-infected and HIV/HCV co-infected individuals for the number of days where one or more alcoholic drinks were consumed, average number of drinks consumed per day, or number of days binge drinking. Adjusted analyses indicated a greater number of days smoking cigarettes, but no differences in the average number of cigarettes smoked per day between groups.

Table 1 Comparison of baseline demographic and HIV medical status characteristics by HCV co-infection status ($N = 247$)

Characteristic	Full sample ($n = 247$) n (%)	HIV only ($n = 106$) n (%)	HIV/HCV co-infected ($n = 141$) n (%)	t	χ^2	p
Sociodemographics						
Age (M, SD)	30.0 (3.0)	29.1 (3.1)	30.8 (2.7)	−4.6		<.001
Marital status					3.4	.04
Not married	140 (56.7)	53 (50.0)	87 (61.7)			
Married	107 (43.3)	53 (50.0)	54 (38.3)			
Employment status					5.4	.01
Not employed	95 (38.5)	32 (30.2)	63 (44.7)			
Employed	152 (61.5)	74 (69.8)	78 (55.3)			
HIV medical status						
Most recent viral load					.04	.48
Undetectable (<50 copies/mL)	174 (70.4)	74 (69.8)	100 (70.9)			
Detectable (>50 copies/mL)	73 (29.6)	32 (30.2)	41 (29.1)			
Number of years HIV-infected (M, SD)	7.1 (4.1)	5.1 (3.4)	8.6 (3.9)	−7.3		<.001

Alcohol Use and Sexual Activity

There were also no differences in the likelihood of reporting alcohol use prior to the last sexual encounter. However, expectancies that alcohol enhances sexual activity were higher among HIV/HCV co-infected individuals.

Discussion

Among HIV-infected individuals, HCV co-infection poses additional health risks and further complicates medical care [7, 9]. Results from this study indicate an elevated prevalence of HCV (57.1 %) among a cohort of HIV-infected women in Russia, a rate that is higher than typically observed among HIV-infected individuals (e.g., 16–33 %; [4–7]). This higher prevalence may in part reflect the intersection of the IDU and HIV epidemics in Russia, particularly in St. Petersburg [55–57] and is consistent with recent data from people who inject drugs across eight Russian cities where HCV prevalence was 71 % [37]. Indeed, almost three-quarters of participants who had used illicit drugs reported a lifetime history of IDU, which has been associated with increased likelihood of HCV co-infection among HIV-infected individuals [4, 8].

Alcohol and drug use among HIV/HCV co-infected individuals may further accelerate liver disease [9, 20, 21] and complicate HIV and HCV treatment [7, 20, 24]. Additionally, substance use has been associated with engagement in behaviors that increase HIV and/or HCV transmission risk to sexual partners or individuals with whom injection equipment may be shared [25]. Individuals with HIV and HCV co-infection reported greater lifetime use of illicit drugs including ephedrone, hallucinogens, heroin, methadone (considered illicit in Russia), and pervitin. These findings mirror extant research comparing HCV-infected and uninfected cohorts; for example, one study identified a greater likelihood of polydrug use and more years of heroin use among individuals with HCV [48]. Further, results are consistent with research pointing to increased prevalence of both HCV and HIV among those engaging in injection drug use [42, 47] or sharing needles [36, 40]. Future research would benefit from a more nuanced assessment of substance use patterns among HIV/HCV co-infected and HIV mono-infected cohorts. For example, additional information regarding the extent to which substance use may have contributed to HCV and/or HIV acquisition would be important for the development of HCV/HIV prevention approaches. Furthermore, assessment of recency, frequency, and quantity of use would allow for tailoring of drug treatment approaches in HIV care settings.

In addition to greater lifetime history of substance use, HCV/HIV co-infected individuals were more likely to report problem drinking based on the AUDIT and greater drug use related problems based on the DAST. Thus, data suggest that HCV/HIV co-infected individuals may also be experiencing more negative consequences associated with their substance use relative to HIV mono-infected individuals. These findings are consistent with research suggesting elevated problematic substance use among HCV-infected individuals [22]. Given the adverse health consequences of alcohol and/or drug use among individuals with HCV/HIV, combined with the possibility of negatively

Table 2 Descriptive statistics and unadjusted comparisons of substance use outcomes among the full sample and HIV mono-infected and HIV/HCV co-infected individuals ($N = 247$)

Outcome							Confidence interval		
	Full sample ($n = 247$) *n* (%)	HIV only ($n = 106$) *n* (%)	HIV/HCV co-infected ($n = 141$) *n* (%)	β	SE	Odds ratio	Lower	Upper	*p*
Problematic substance use									
AUDIT total score (M, SD)	3.5 (4.2)	2.7 (2.6)	4.1 (5.0)	1.4	.54				.01
Elevated AUDIT score	29 (11.7)	7 (6.6)	22 (15.6)			2.6	1.1	6.4	.04
DAST total score (M, SD)	1.3 (2.5)	.45 (.19)	1.5 (2.7)	1.1	.45				.02
Lifetime substance use									
Any illicit substance use	158 (64.0)	38 (35.8)	120 (85.1)			10.2	5.6	18.8	<.001
Cigarette use	232 (93.9)	94 (88.7)	138 (97.9)			5.9	1.6	21.4	<.01
Injection drug use[a]	114 (72.2)	7 (18.4)	107 (89.2)			36.5	13.4	99.3	<.001
Shared needles[b]	92 (80.7)	3 (42.9)	89 (83.2)			6.6	1.4	32.0	.02
Cocaine/crack[a]	67 (42.4)	14 (36.8)	53 (44.2)			1.4	.64	2.9	.43
Ecstasy[a]	35 (22.2)	9 (23.7)	26 (21.7)			.89	.38	2.1	.79
Ephedrone[a]	65 (41.1)	1 (2.6)	64 (53.3)			42.3	5.6	318.3	<.001
Hallucinogens[a]	48 (30.4)	6 (15.8)	42 (35.0)			2.9	1.1	7.4	.03
Heroin[a]	110 (69.6)	8 (21.1)	102 (85.0)			21.3	8.4	53.7	<.001
Marijuana[a]	140 (88.6)	36 (94.7)	104 (86.7)			.36	.08	1.6	.19
Methadone[a]	66 (41.8)	2 (5.3)	64 (53.3)			20.6	4.7	89.3	<.001
Speed/uppers, methamphetamine[a]	110 (69.6)	23 (60.5)	87 (72.5)			1.7	.80	3.7	.16
Pervitin[a]	53 (33.5)	2 (5.3)	51 (42.5)			13.3	3.1	57.8	<.001
History of substance use treatment[a,e]	65 (41.1)	0 (0)	65 (54.2)			–	–	–	–
Alcohol use: past month									
# Days with ≥1 drinks (M, SD)	2.9 (4.6)	2.6 (3.5)	3.2 (5.3)	.69	.59				.25
Average # of drinks per day (M, SD)	2.4 (1.9)	1.9 (1.4)	2.8 (2.2)	.86	.28				<.01
# Days of binge drinking (M, SD)[c]	1.3 (2.6)	.87 (1.9)	1.7 (2.9)	.89	.39				.03
Cigarette use: past month									
# Days smoking cigarettes (M, SD)[d]	16.4 (14.1)	13.1 (14.1)	18.6 (13.7)	5.6	1.9				<.01
Average # cigarettes per day (M, SD)[d]	12.1 (8.6)	10.1 (8.3)	13.1 (8.6)	3.0	1.5				.04
Alcohol use prior to last sex	40 (16.2)	12 (11.3)	28 (19.9)			1.9	.94	4.0	.08
Alcohol expectancies	6.9 (3.1)	6.5 (2.9)	7.3 (3.1)	.85	.39				.03

Reference group are individuals with HIV mono-infection. *p* values are for unadjusted logistic and linear regression analyses

[a] $n = 158$ reporting

[b] $n = 114$ reporting

[c] $n = 168$ reporting

[d] $n = 232$ reporting

[e] Insufficient sample in the reference group

Table 3 Covariate adjusted comparisons of substance use outcomes between HIV mono-infected and HIV/HCV co-infected individuals ($N = 247$)

Outcome	β	SE	Odds ratio	Confidence interval		p
				Lower	Upper	
Problematic substance use						
AUDIT total score	1.2	.61				.05
Elevated AUDIT score			2.8	1.0	7.4	.04
DAST total score	1.3	.49				<.01
Lifetime substance use						
Any illicit substance use			8.3	4.2	16.3	<.001
Cigarette use			9.7	2.1	44.2	<.01
Injection drug use[a]			26.4	8.5	81.9	<.001
Shared needles[b]			6.6	1.3	33.0	.02
Cocaine/crack[a]			1.4	.62	3.3	.41
Ecstasy[a]			1.1	.39	2.8	.93
Ephedrone[a]			23.2	2.9	181.2	<.001
Hallucinogens[a]			2.9	1.1	8.2	.04
Heroin[a]			13.2	4.9	35.3	<.001
Marijuana[a]			.38	.07	1.9	.25
Methadone[a]			17.4	3.8	79.4	<.001
Speed/uppers, methamphetamine[a]			1.7	.70	3.9	.25
Pervitin[a]			8.5	1.9	38.9	<.01
History of substance use treatment[a,e]			–	–	–	–
Alcohol use: past month						
# Days with ≥1 drinks	.56	.66				.39
Average # of drinks per day	.51	.30				.09
# Days of binge drinking[c]	.79	.44				.07
Cigarette use: past month						
# Days smoking cigarettes[d]	6.4	2.1				<.01
Average # of cigarettes per day[d]	2.2	1.7				.18
Alcohol use prior to last sex			1.8	.80	4.2	.15
Alcohol expectancies	.88	.45				.05

Reference group are individuals with HIV mono-infection. Adjusted analyses control for age, marital status, employment status, and number of years HIV-infected

[a] $n = 158$ reporting

[b] $n = 114$ reporting

[c] $n = 168$ reporting

[d] $n = 232$ reporting

[e] Insufficient sample in the reference group

impacting other personal domains (e.g., relationships, finances, etc.), these data suggest the need for interventions to reduce alcohol and drug use among this population.

Despite the increased prevalence of problematic drinking among those with HCV/HIV co-infection, there were no differences between the co- and mono-infected groups for likelihood of alcohol use prior to the most recent sexual encounter. However, the overall prevalence of alcohol use across the full sample was low with only 16 % reporting alcohol use at the last sexual encounter. In contrast, HIV/HCV co-infected individuals endorsed stronger beliefs that alcohol affects sexual behaviors relative to HIV mono-infected individuals. Future research would benefit from examining the co-occurrence of substance use and sexual risk behaviors over time, across multiple sexual episodes, and for other substances in addition to alcohol. This would allow for a better understanding of how uses of particular substance(s) in conjunction with substance sex-related expectancies are associated with differential sexual risk engagement.

Strengths and Limitations

To our knowledge, this is the first study to examine differences in substance use patterns, the intersection of alcohol use and sexual activity, and alcohol-related sex

expectancies between HIV-infected women with and without HCV co-infection. Strengths of the study include recruitment of a cohort of HIV-infected Russian women, inclusion of validated measures of problematic alcohol and drug use, and assessment of a range of substance use activities. Our study was limited by a reliance on self-reported substance use. Assessment of lifetime substance use did not allow for an examination of more recent use (e.g., frequency/quantity of use, substance use in conjunction with sexual activity). Our measure of HCV relied on participants' HCV antibody status, so we were unable to determine the prevalence of chronic HCV among this sample. Additionally, we enrolled a sample of HIV-infected women aged 18–35 years engaged in HIV care in St. Petersburg, Russia, so findings may not generalize to other HIV-infected samples or other geographic regions within Russia (e.g., less urban areas, regions with lower prevalence of IDU, cities with less prevalent HIV/HCV co-infection).

Conclusions

HIV/HCV co-infection was prevalent among this sample and was associated with increased prevalence of substance use, problem alcohol and drug use, and expectations that alcohol use influences sexual behaviors. Findings highlight the need for ongoing assessment of substance use among HIV- and HIV/HCV-infected individuals combined with the development and evaluation of interventions targeting both substance use and HCV/HIV risk among HIV-infected Russian women. Additionally, enhancing the availability of drug treatment services in Russia may synergistically address the drug, HIV, and HCV epidemics. For example, there is evidence to suggest that receipt of opioid substitution treatment (e.g., methadone, buprenorphine) decreases incident HCV and HIV infections [58–60] along with risk behaviors such as unsafe needle practices [61]. However, there is a lack of widespread acceptance for specific harm reduction approaches (e.g., syringe exchange; [37]) and drug treatment approaches (e.g., opioid substitution treatment; [38]) within Russia. As such, a focus on implementing and evaluating behavioral intervention approaches to address substance use (e.g., Motivational Interviewing, Cognitive Behavioral Therapy; [62]) may hold greater promise in Russia. Furthermore, care models that integrate substance use treatment and medical care for HCV and HIV may be the most effective treatment models to address the complex care needs of this population [63], and may be bolstered by addressing stigma associated with treatment for drug use and HIV [64].

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Compliance with Ethical Standards

Conflicts of Interest Dr. Brown, Dr. DiClemente, Dr. Sales, Ms. Rose, Ms. Safonova, Ms. Levina, Dr. Belyakov, Dr. Rassokhin declares that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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