AIDS Care

Harmful alcohol consumption and patterns of substance use in HIV-infected patients receiving antiretrovirals (ANRS-EN12-VESPA Study): relevance for clinical management and intervention

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Online publication date: 06 September 2010

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Harmful alcohol consumption and patterns of substance use in HIV-infected patients receiving antiretrovirals (ANRS-EN12-VESPA Study): relevance for clinical management and intervention

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Alcohol abuse affects secondary prevention and disease progression in HIV-infected patients, and adherence and response to treatment in those chronically treated. The objective of this study was to estimate the prevalence of harmful alcohol consumption (HAC) using various indicators and identify which groups of patients may require specific targeted interventions for HAC risk reduction.

A cross-sectional survey, based on a random sample representative of people living with HIV/AIDS (PLWHA) was carried out in 102 French hospital departments delivering HIV care. As alcohol abuse is particularly detrimental to patients receiving highly active antiretroviral therapy (HAART), we focused only on those individuals receiving HAART with complete alcohol assessment (CAGE, AUDIT-C, regular binge drinking, $N = 2340$). Collected information included medical and socio-demographic data, HIV risk behaviors, adherence to treatment and substance and alcohol use, together with depression, anxiety, and experience of attempted suicide or sex work. HAC prevalence was evaluated as follows: 12% (CAGE score ≥ 2), 27% (AUDIT-C), and 9% (regular binge drinking). Three groups were at higher risk of HAC: men who have sex with men using stimulants, polydrug users, and to a lesser degree, ex-drug users.

Innovative intervention strategies to reduce HAC and improve HIV prevention and HAART adherence in various PLWHA populations need urgent testing and implementation. Such interventions for alcohol risk reduction remain central to promoting improved HIV prevention and assuring HAART effectiveness in these populations.

Keywords: alcohol abuse; HIV; antiretroviral therapy; adherence; unsafe sex

Introduction

Harmful alcohol consumption (HAC) prevalence is high in HIV-infected individuals ranging from 8.9 to 33% depending on the scale employed to assess alcohol use (Braithwaite et al., 2005; Chander, Lau, & Moore, 2006; Conigliaro, Gordon, McGinnis, Rabeneck, & Justice, 2003; Walley et al., 2008). It is a major determinant of progression to AIDS (Conigliaro et al., 2003; Study Group for the MRC Collaborative Study of HIV Infection in Women, 1999). This is probably due to reduced adherence to highly active antiretroviral therapy (HAART) (Berg et al., 2004; Braithwaite et al., 2008; Chander et al., 2006; Spire et al., 2002) or perhaps to a particular interaction between HAC and adherence (Finucane, Samet, & Horton, 2007). Previous research has already highlighted a close relationship between risky drug/sexual behaviors, alcohol abuse (Bouhnik et al., 2004; Stein et al., 2005), and binge drinking (Kasenda, Calzavara, Johnson, & LeBlanc, 1997; Theall, Clark, Powell, Smith, & Kissinger, 2007).

In the HAART era, HAC in HIV-infected patients has been associated with increased mortality (Braithwaite et al., 2007; Di Martino et al., 2001; Galai et al., 2005; Hooshyar et al., 2007; Lewden et al., 2005; Puoti et al., 2000; Rosenthal et al., 2003, 2007), mostly from liver diseases (Di Martino et al., 2001; Lewden et al., 2005; Puoti et al., 2000; Rosenthal et al., 2007) and particularly in women (Hessol et al., 2007). Recent heroin and cocaine use as well as homelessness, have also been identified as major determinants of early mortality in

HIV-infected patients with alcohol problems (Walley et al., 2008).

In Hepatitis C Virus (HCV) co-infected patients, Human Immunodeficiency Virus (HIV) and alcohol abuse are two factors related to increased liver disease progression (Monto, Currie, & Wright, 2008). Alcohol accelerates the rate of hepatic fibrosis in HIV–HCV co-infection and its excessive use impairs interferon-based HCV therapy efficacy (Cooper, 2008).

Efficient prevention, care, and intervention for HIV/AIDS individuals with HAC therefore present major clinical and public health challenges.

Modes of HAC may vary across the different groups of PLWHA and receiving HAART. For example, patterns of substance use including alcohol may differ between the intravenous drug users (IDU) and men who have sex with men (MSM) HIV transmission groups (Dobler-Mikola et al., 2005; Hillebrand, Marsden, Finch, & Strang, 2001; Stall et al., 2001). Consequently, it is important to characterize the pattern of drug use in these sub-populations to better individualize strategies aimed to alcohol and drug risk reduction. The choice of relevant tools for assessing HAC is also important to properly design and address preventive interventions and provide patients with appropriate clinical management.

Using data from a large representative sample of HIV-infected patients in France, the aim of the present study was to corroborate the prevalence of HAC found in previous studies and identify which groups of patients may require specific targeted interventions for HAC risk reduction.

Methods

Setting and participants

We used data from the French National Agency of AIDS Research (ANRS, France) cross-sectional national survey (ANRS-EN12-VESPA Study), conducted among a random stratified sample of 4963 PLWHA and recruited in 102 French hospital departments delivering HIV care. The study design has already been detailed elsewhere (Peretti-Watel, Riandey, Dray-Spira, Bouhnik, & Obadia, 2005). Eligible subjects were outpatients diagnosed as HIV-1-positive for at least six months, aged 18 or older and living in France for at least six months. In the participating units, physicians proposed the survey to a random sample of HIV-infected patients. Those who agreed to participate signed an informed-consent form and answered a face-to-face questionnaire administered by a trained interviewer using the Computer-Assisted Personal Interview (CAPI) sys-

tem. The entire procedure of data collection was reviewed and approved by an independent human research ethics committee (the Commission Nationale Informatique et Liberté).

Questionnaire

The questionnaire included 10 modules and completed interviews lasted 40 minutes on average. One section of the questionnaire collected data about gender, age, geographic origins, religion, education, employment, unsafe sexual behaviors with HIV-negative partners or partners of unknown serostatus, experience of discrimination and sex work, history of incarceration, and suicidal ideation or attempt.

The questionnaire also gathered HIV related patient information, such as transmission group, time since diagnosis, number of years on HAART, self-reported side effects with associated discomfort, and finally adherence to HAART; this latter being measured using an indicator combining several questions (Peretti-Watel, Spire, Lert, & Obadia, 2006).

Patient history of AIDS-defining events (Centers for Disease Control and Prevention stage C classification), plasma HIV viral load, CD4 cell count, and HCV chronic co-infection were retrieved from medical records.

The Hospital Anxiety and Depression (HAD) scale (Zigmond & Snaith, 1983) – a 14-item self-evaluation instrument for anxiety (HAD-A) and depression (HAD-D; seven items for each scale and scores ranging from 0 to 21) – was used to assess both of these conditions at the time of the interview with 8 as the cut-off point, in order to detect clinically significant depressive or anxiety related symptoms (Bjelland, Dahl, Haug, & Neckelmann, 2002).

The questionnaire gathered information on the consumption of prescribed and non-prescribed psychotropic drugs (e.g., anxiolytics, antidepressants, or sleeping pills); opioid substitution treatment (buprenorphine or methadone) during the previous four weeks as well as information about smoking habits (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991); and the use of cannabis, heroin, and stimulants (ecstasy, cocaine or amphetamine) during the previous 12 months.

Outcomes

The CAGE (Mayfield, McLeod, & Hall, 1974) and AUDIT-C (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998) questionnaires were used to characterize alcohol use in the study sample. AUDIT-C includes the binge drinking dimension and this was also analyzed as an additional outcome. In the end,

three dichotomous HAC indicators were used as outcome variables:

- Symptoms of potential alcohol abuse/dependence during the previous 12 months using the CAGE questionnaire (score ≥ 2; Mayfield et al., 1974).
- Regular binge drinking (six or more alcohol units drunk consecutively at least twice a month).
- AUDIT-C: score (varying between 0 and 12) greater than four and five for women and men, respectively (Reinert & Allen, 2007).

Statistical analysis

HAC prevalence, based on the three indicators and their 95% confidence intervals, was calculated using binomial distribution.

Kappa statistics to evaluate agreement between the three HAC indicators were also computed.

The strength of the association between each HAC indicator, adherence and unsafe sexual behaviors was estimated with ORs and 95% confidence intervals using a weighted logistic regression to take the sampling plan into account. Because patients who attended outpatient clinics more frequently were over-represented, the sample was weighted by the inverse of patients' annual number of visits in the clinic.

As some addictive behaviors may appear clustered in some individuals, examining the relationship between the use of specific substances and HAC could lead to misleading results. To overcome this problem and identify the subgroups with specific patterns of substance use (other than alcohol use) which could be at increased risk of HAC, we used a multiple correspondence analysis following an approach similar to that used in a previous study (Peretti-Watel et al., 2006). These behaviors included smoking, cannabis use, opioid use (including substitution treatment), cocaine, and other stimulants. Once the subgroups were identified, the associations between the different patterns of factors and each dimension of HAC were tested using logistic regression analyses. Variables were considered as candidates for multivariate testing if the associated univariate p-value was < 0.25. A backward procedure based on the Wald test was then used to make a first selection of significant variables. Finally, in order to have the same pattern of predictors for the three multivariate models and not to miss important predictors of the outcomes, all three models were adjusted for variables which were either statistically significant ($p < 0.05$) in at least one of the three models or had a p-value < 0.10 in at least two models.

Cluster analyses were performed using SAS software® (SAS Institute, Cary, NC, USA). SPSS (SPSS Inc, Chicago, IL, USA) was used in all other analyses.

Results

Of 4963 eligible patients, 1767 refused to participate while 264 were not solicited because their physicians considered that their physical or psychological conditions were not compatible with their participation in the survey (2932 participants, response rate 59%). Non-respondents were not significantly different from respondents with respect to gender, age, viral load, or lymphocyte count.

For our study, we restricted our analyses to HAART treated patients ($n = 2340$).

Socio-demographic and behavioral characteristics

Median [interquartile range (IQR)] age was 42 [37; 48] years: 625 (26.7%) were women; 685 (29.3%) had university level education; 614 (26.2%) experienced clinical progression to AIDS (CDC stage C). Median CD4 cell count was 455 [291; 644] and 1817 (77.7%) had a HIV RNA plasma viral load ≤ 400 copies/ml.

Median [IQR] HAD-A score was 8 [5; 11]; anxiety symptoms (HAD-A score ≥ 8) were found in 954 (40.8%) patients. Median [IQR] HAD-D score was 4 [2; 7]; depressive symptoms (HAD-D score ≥ 8) were found in 404 (17.3%) patients. Consumption of anxiolytics and antidepressants was reported by 488 (20.9%) and 220 (9.4%) patients, respectively.

Prevalence of excessive alcohol consumption

HAC prevalence was evaluated as follows: 12.4%, 95% CI [11.1–13.7] (CAGE score ≥ 2); 26.9%, 95% CI [25.1–28.7] (AUDIT-C); and 9.4%, 95% CI [8.2–10.6] (regular binge drinking).

Agreement between the different measures of HAC based on the Kappa statistics was acceptable: 0.47 for CAGE vs. regular binge drinking; 0.43 for CAGE vs. AUDIT-C; and 0.44 for regular binge drinking vs. AUDIT-C.

Each HAC indicator was significantly associated with non-adherence to HAART ($p < 0.001$) and but only regular binge drinking and AUDIT-C were significantly associated with unsafe sexual behaviors with a HIV-negative or unknown HIV serostatus partner ($p < 0.05$ and $p < 0.03$, respectively).

The correspondence analysis performed on this data-set facilitated the identification of five groups of individuals which, according to the variables that composed them (data not shown), were labeled as drug-free, MSM stimulant users, ex-IDUs, moderate

Table 1. Factors characterizing substance use groups identified through a correspondence analysis (ANRS-EN12-VESPA survey; $n = 2340$).

Variables	Group 1 Drug free, % ($n = 1302$)	Group 2 MSM-stimulant users,% ($n = 283$)	Group 3 Ex-IDUs, % ($n = 401$)	Group 4 Moderate smokers, % ($n = 213$)	Group 5 Polydrug users,% ($n = 141$)
HIV transmission group					
MSM	40.9	85.0	32.0	38.0	18.6
IDU	9.5	10.0	34.9	18.5	72.1
Heterosexual	49.6	5.0	33.1	43.5	9.3
Financial precariousness	27.5	21.2	28.9	27.7	43.3
Secondary school certificate	27.2	43.5	26.9	31.5	23.4
Living in a couple	28	11.3	20.4	21.2	18.4
Being a migrant	27.1	6.0	15.2	21.1	12.3
Employed	57.1	70.2	55.5	56.3	42.6
HCV co-infection	15.4	11	34.7	23.5	68.1
Male gender	69.1	96.8	71.8	70.4	73.8
Having no children	51.2	84.8	61.4	58	61
Importance of religion	45	25.1	30.2	35.2	29.8
Experience of discrimination	30.8	47.7	42.2	41.9	64.5
Experience of incarceration	7.3	8.8	21.1	9.4	48.6
Experience of attempted suicide	18.6	28.6	21.7	19.8	34.0
Sex work	3.5	9.2	5.3	5.3	13.6
Opioid use	0	1.4	0	0	57.4
Cocaine use	0	22.7	1.0	2.8	22.7
Stimulant use	0	92.2	6.5	11.3	13.5
Opioid substitution treatment	0	1.8	0	3.3	56.7
Cannabis use					
None	93.1	55.5	39.7	62.0	41.1
Occasional	0	26.1	44.6	23.0	19.9
Regular	6.9	18.4	15.7	15.0	39
Cigarette smoking					
0	76.3	56.2	10.7	0	14.9
1–9	0	0.7	0	100	5.7
10–19	0	7.1	73.8	0	31.2
≥20	23.7	36	15.5	0	48.2

smokers, and polydrug users. Their characteristics are described in Table 1. Two groups (drug-free and moderate smokers) exhibited comparable association with HAC. We therefore decided to aggregate them, labeling this group "drug free" (reference group). Consequently only four groups were included in the final models.

Harmful alcohol consumption (HAC) and associated factors

Factors associated with HAC in the univariate analyses as measured by CAGE, regular binge drinking, and AUDIT-C are presented Table 2.

As explained in the Methods section, the three final fixed models (Table 3) included age, gender, education, anxiety symptoms, attempted suicide and discrimination, the importance attributed to religion and the groups identified by the correspondence analysis (five groups reduced to four). MSM using stimulants, ex-IDUs, and polydrug user groups were at significantly higher risk of alcohol abuse/dependence (CAGE) and regular binge drinking with respect to the reference group while only MSM stimulant users and ex-IDUs were screened positive for HAC by AUDIT-C. Experience of discrimination was associated (though not strictly significantly) with both alcohol abuse/dependence (CAGE) and regular binge drinking but not with AUDIT-C. Anxiety symptoms were marginally identified as determinants of HAC when using AUDIT-C as the outcome, while instead they were significantly associated with both the CAGE indicator of alcohol abuse/dependence and regular binge drinking. Experience of attempted suicide was significantly associated only with alcohol dependence/abuse (CAGE). While individuals with a lower educational level were more likely to abuse or be dependent on alcohol (CAGE), a lower educational

Table 2. Factors associated with harmful alcohol consumption (HAC) as measured by CAGE, regular binge drinking, and AUDIT-C: univariate analyses.

	Univariate analysis					
	CAGE		Regular binge drinking		AUDIT-C	
	p	OR [95% CI]	*p*	OR [95% CI]	*p*	OR [95% CI]
Age (≥40 years)	0.3	0.88 [0.68–1.13]	0.74	0.95 [0.72–1.27]	0.02	1.26 [1.04–1.52]
Male gender	0.004	1.58 [1.16–2.14]	<0.001	2.43 [1.64–3.60]	<0.001	1.68 [1.35–2.10]
Living in a couple	0.12	0.78 [0.58–1.06]	0.005	0.58 [0.40–0.85]	0.09	0.83 [0.66–1.03]
Having no children	0.2	1.18 [0.92–1.52]	0.002	1.61 [1.20–2.17]	0.003	1.33 [1.10–1.60]
Secondary school certificate	0.05	0.75 [0.56–1]	0.74	0.95 [0.70–1.29]	0.87	0.98 [0.80–1.20]
Importance of religion	0.41	0.90 [0.70–1.16]	<0.001	0.55 [0.40–0.76]	<0.001	0.57 [0.47–0.69]
Experience of discrimination	<0.001	1.62 [1.27–2.08]	<0.001	1.71 [1.29–2.26]	0.13	1.16 [0.96–1.40]
Experience of incarceration	<0.001	2.52 [1.86–3.42]	0.001	1.88 [1.32–2.68]	<0.001	1.64 [1.26–2.12]
Experience of attempted suicide	<0.001	1.75 [1.34–2.30]	0.07	1.35 [0.98–1.85]	0.45	1.09 [0.87–1.36]
Substance use profiles	<0.001		<0.001		<0.001	
Drug-free		1		1		1
MSM stimulants cocaine users		2.13 [1.49–3.04]		3.56 [2.47–5.14]		2.36 [1.80–3.11]
Ex-IDU		1.83 [1.32–2.54]		1.87 [1.28–2.74]		1.95 [1.53–2.49]
Moderate smokers		1.18 [0.74–1.89]		0.78 [0.41–1.49]		1.20 [0.86–1.69]
Polydrug users		2.70 [1.74–4.20]		2.98 [1.82–4.88]		1.75 [1.20–2.55]
Anxiety (HAD)	0.001	1.61 [1.21–2.14]	0.007	1.55 [1.12–2.13]	0.14	1.17 [0.95–1.43]
Use of hypnotics	0.03	1.49 [1.05–2.12]	0.77	1.07 [0.69–1.64]	0.08	1.28 [0.97–1.69]

level was only marginally associated with regular binge drinking. It was not significantly associated with AUDIT-C. Men had at least a 40% increased risk of HAC whatever the indicator used (CAGE, regular binge drinking, or AUDIT-C).

Discussion

This study, based on a representative sample of HIV-infected individuals receiving HAART in France, is the only national assessment available regarding the prevalence of HAC in this population, using three different assessments of alcohol use. The prevalences of HAC found in the study sample were 12.4% using CAGE score ≥2, 26.9% with AUDIT-C, and 9.4% for regular binge drinking.

Our analysis highlights three primary high-risk groups for HAC: "stimulant users" mainly consisting of MSM using stimulants, "polydrug users," and to a lesser extent "ex-drug users". The "stimulant users" group presented the most severe problems with alcohol. They were mainly MSM with a high educational level and employed but who had also experienced sex work, discrimination, and attempted suicide. The "Polydrug users", also at high risk of alcohol abuse or dependence, were characterized by HIV transmission through intravenous drug use, HCV co-infection, suicide attempts, and severe social vulnerability. The "ex-drug users" group, having risky alcohol use behaviors, was mainly characterized

by IDU transmission, frequent HCV co-infection and a history of prison.

Clearly the first two groups are at higher risk of HAC and require specific targeted interventions for risk reduction. Consistent with previous research, the three dimensions of HAC were correlated to both reduced adherence to HAART (Berg et al., 2004; Braithwaite et al., 2008; Chander et al., 2006; Gordon et al., 2006; Kim et al., 2007; Samet et al., 2005; Spire et al., 2002) and unsafe sexual behaviors (Kasenda et al., 1997; Peretti-Watel, Spire, Obadia, & Moatti, 2007; Theall et al., 2007; Valois, Oeltmann, Waller, & Hussey, 1999).

Another important result of this analysis is that the use of the AUDIT-C indicator did not identify polydrug users as a group at risk of HAC.

AUDIT-C is a shortened version of AUDIT, using questions designed to screen for hazardous alcohol use but dropping those designed to screen for symptoms of dependence or harmful alcohol use (Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). In addition, because of its high sensitivity but low specificity, AUDIT-C may case-mix different profiles of alcohol abuse. In this way it fails to identify both subgroups requiring improved clinical management of co-occurring disorders, and consequently interventions for improving adherence and preventing HIV transmission. Following Room, Babor, and Rehm (2005), the information required to estimate variations in the global burden of disease attributable to

Table 3. Factors independently associated with harmful alcohol consumption (HAC) as measured by CAGE, regular binge drinking, and AUDIT-C.

	Multivariate analysis					
	CAGE		Regular binge drinking		AUDIT-C	
	p	OR [95% CI]	*p*	OR [95% CI]	*p*	OR [95% CI]
Age (≥40 years)	0.83	1.03 [0.77–1.39]	0.74	0.95 [0.68–1.32]	0.05	1.25 [1–1.56]
Male gender	0.06	1.42 [0.98–2.05]	0.004	1.99 [1.24–3.18]	0.01	1.41 [1.08–1.85]
Secondary school certificate	0.09	0.76 [0.55–1.05]	0.06	0.71 [0.50–1.02]	0.12	0.83 [0.66–1.05]
Importance of religion	0.39	1.14 [0.84–1.55]	0.03	0.66 [0.46–0.96]	0.004	0.71 [0.56–0.90]
Experience of discrimination	0.06	1.33 [0.98–1.79]	0.05	1.39 [1–1.94]	0.98	1 [0.80–1.25]
Experience of attempted suicide	0.03	1.44 [1.03–1.99]	0.46	1.15 [0.79–1.68]	0.85	1.03 [0.79–1.33]
Substance use profiles	<0.001		<0.001		<0.001	
Drug-free		1.00		1.00		1.00
MSM stimulants' cocaine users		2.12 [1.42–3.16]		3.09 [2.04–4.68]		1.98 [1.45–2.69]
Ex-IDU		1.86 [1.29–2.68]		1.71 [1.11–2.63]		1.88 [1.43–2.47]
Polydrug users		2.16 [1.30–3.57]		2.26 [1.29–3.97]		1.42 [0.93–2.17]
Anxiety (HAD)	0.02	1.43 [1.06–1.93]	0.03	1.47 [1.05–2.06]	0.08	1.21 [0.98–1.51]

Note: Living in a couple, having no children, experience of incarceration, and use of hypnotics were all significantly associated in the univariate analyses with at least one of the three outcomes.

alcohol is the average volume of alcohol consumption and the predominant patterns of drinking. These need to be assessed, properly combined, and adapted to primary or specialized care settings. According to Bush et al. (1998), AUDIT performs better than AUDIT-C in detecting active alcohol abuse/dependence, while AUDIT-C is better than CAGE when screening for heavy drinking and/or for active alcohol abuse or dependence.

Men are consistently at higher risk of HAC across the three analyses, as already shown in a previous study in HIV-infected patients (Chander et al., 2008). However, this is also true in other non-HIV-infected populations (Beck et al., 2006; Hasin, Stinson, Ogburn, & Grant, 2007) as well as older individuals, as has been recently reported in the general French population (Beck et al., 2006).

Similarly, individuals with anxiety symptoms were more likely to practice binge drinking or to be concerned by alcohol abuse/dependence (CAGE). Surprisingly, the presence of depressive symptoms was not correlated to any of the HAC indicators. This result could be explained by the low specificity of HAD in screening for individuals with major depression. Another explanation could be that depression is better captured by experience of suicide attempts. Stack (2000), in a review of the literature on suicide, was able to show that higher the alcohol consumption, the higher the suicide rate. For example in France, this increase in suicide rates was 2.6% per one liter per capita increase in consumption. The relationship between alcohol misuse and suicide is complex and is probably mediated through long-term

interrelated effects on mood and social processes including experience of discrimination, something which is acknowledged to be a major correlate of depression (Sher, 2006).

It is important to note that the prevalence of HAC (CAGE) and regular binge drinking is higher than that observed in the general population. HAC prevalence nevertheless is comparable to that found in other HIV cohort studies (Braithwaite et al., 2005; Conigliaro et al., 2003; Kim et al., 2007).

Some limitations need to be acknowledged. First, 40% of the solicited patients refused to participate, most frequently citing lack of time as their explanation. Nevertheless, non-respondents were not significantly different from respondents in regard to gender, age, viral load, or lymphocyte count (Peretti-Watel et al., 2006). Second, face-to-face surveys frequently induce social-desirability response bias, which might lead respondents to underreport certain behaviors such as alcohol or drug use. This is probably particularly true for alcohol consumption, for which interactions with HAART are well known or for heroin use and injection which are both associated with social stigma. However, this misclassification may only underestimate the strength of the associations found.

One major limitation in the identification of HAC using CAGE is its lifetime evaluation. In our study, we used a version of CAGE which evaluated alcohol use in the previous 12 months i.e., the impact of "recent" alcohol consumption. Restricting the questions to the previous 12 months allowed us to minimize possible recall bias. One possible limitation may be related to the cut-off scores used in our study,

which could have led to an underestimation of HAC in the study sample. We chose to explore "regular" binge drinking (more than five drinks twice a month), as defined in the third question of the AUDIT-C, rather than simple binge drinking. In addition, we adopted a higher cut-off score for the AUDIT-C (Reinert & Allen, 2007) to improve the detection of any alcohol use disorder and not only hazardous drinking. The use of the higher cut-off score is justified by the very high level of alcohol consumption in the French general population (WHO, 2004), which requires adapted evaluations (Room et al., 2005) with relevant cut-off scores in order to identify "abnormal" use.

In France, the health insurance system allows even marginalized populations to have free access to care (Grignon, Perronnin, & Lavis, 2007), not only for HIV but also for drug dependence. For this reason, our study population can be considered representative of the true HIV-infected population in France and accordingly we can assume that drug users are adequately represented. Recommendations for HAART initiation in France at the time of the study were as follows: HAART initiation for symptomatic patients or patients with less than 350 CD4/mm^3; for asymptomatic patients with CD4 > 350/mm^3, HAART initiation should be considered when viral load is high (>100,000 copies/ml; Delfraissy, 2002, 2004).

One major implication of our study is that interventions for minimizing HAC are routinely needed in HIV-infected patients in order to improve adherence, reduce unsafe sexual behaviors, and probably the risk of suicide. Interventions for reducing alcohol use can be effective even in individuals who are alcohol dependent. According to Schuckit (2009), up to 60% of men and women with alcohol dependence abstain or show substantial improvements in functioning in the first year of treatment. If the common goal of interventions for harmful alcohol use is abstinence, reduction in alcohol use should also be considered for those unable to achieve or refusing abstinence.

Non-specific brief medical advice (Fleming et al., 2002) or intervention (Kaner et al., 2009) for the treatment of alcohol drinking, mainly based on education, has already demonstrated its sustained efficacy in the general population, by increasing health care utilization, reducing alcohol use, motor vehicle accidents, and associated costs. Motivational interviewing is another key strategy to promote change (Schuckit, 2009). It is based on empathetic interactions with the patient, positive feedback, self-evaluation, and self-efficacy enhancement. Cognitive behavioral therapy and rehabilitation are efficient in preventing relapse (Schuckit, 2009) and should be combined with pharmacotherapy and/or medical management (Anton et al. 2006).

Pharmacotherapy for alcohol abuse or dependence includes acamprosate, naltrexone, and disulfiram. As an opioid antagonist, naltrexone is contraindicated in patients receiving opioid maintenance therapy. Disulfiram use is controversial but its efficacy under supervision, in order to ensure compliance, has been demonstrated (Garbutt, 2009). Nevertheless, its prescription in patients receiving HAART may be contraindicated. Referral to a specialist or detoxification has to be considered when alcohol problems are severe or mixed with psychiatric disorder/drug abuse or dependence.

Complementary comprehensive approaches should be assessed in subpopulations of HIV-infected patients with high risk behaviors, using an adapted package of interventions, according to the group.

For "polydrug users", delivering comprehensive care for HIV and HCV, drug dependence, alcohol use and also for psychiatric disorders can potentially reduce HIV risk practices and enhance adherence to and effectiveness of HAART. Psychosocial evaluation and support should be implemented more often in daily care as it constitutes the first necessary step in care initiation. Self-help programs, such as the 12-step programs of Alcoholics or Narcotics Anonymous, are easily accessible and very helpful in promoting peer-support for sobriety and abstinence, even in drug-dependent or polydrug users (Laudet, 2008). Brief motivational interviewing (two hours of motivational interviewing, one month apart) was found to be effective (37.5% reduction in drinking days) at one month, with sustained efficacy at six months, in injecting drug users attending a needle exchange program (Stein, Charuvastra, Maksad, & Anderson, 2002).

Harm reduction and psychosocial interventions (Knapp, Soares, Farrel, & Lima, 2007) for stimulant users practicing binge drinking should aim to foster sustained adherence to HAART and to minimize unsafe sexual practices with HIV-negative partners or partners of unknown serostatus. Unfortunately, brief motivational interviewings could be less or inconstantly effective in stimulant users (Marsden et al., 2006; Stein, Herman, & Anderson, 2009). Innovative approaches should be designed for these patients, including peer-support or peer-education for MSM in places where stimulants are used. Behavioral interventions have been found to be effective in reducing sexual risky behaviors in MSM (Johnson et al., 2008) and should be associated with behavioral therapy targeting harmful alcohol use.

In conclusion, this study clearly suggests that several groups of people living with HIV and AIDS share the same HAC related problems and that effective screening for binge drinking behaviors is needed. Innovative intervention strategies to reduce HAC and improve HIV prevention and HAART adherence in different populations of PLWHA need to be urgently tested and implemented. Such interventions for alcohol risk reduction remain a central requirement to promoting improved HIV prevention and assuring HAART effectiveness in these populations.

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