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A PEER-REVIEWED ARTICLE

Alcohol and HIV: a serious cocktail for transmission and medication adherence

Ronald D. Wilcox, MD, FAAP

Over the past year, many articles have been published or are soon to be published on the effects of alcohol use in the setting of HIV, especially regarding risky behavior and adherence to antiretroviral therapy. This article attempts to summarize some of the findings that should be of interest to HIV-treating medical personnel.

A study of 1,130 students performed at a large, urban, minority-serving university in Florida showed 14% reported risky sexual behavior (having more than one sexual partner in one year and not using a condom the last time they had vaginal intercourse), and 11.9% reported consistent risky sexual behavior (having more than one partner in one year and not using condoms most or all of the time during the past 30 days). Alcohol use over the preceding month had the strongest independent association with both risky and consistent risky sexual behavior in multivariable analysis. This study demonstrated the need to address alcohol use when attempting prevention efforts for college-aged young adults.

Among male commercial sex workers in Kenya who had sex with other men, the use of alcohol three or more days a week increased the chance of having unprotected anal sex (OR 1.63; 95% CI, 1.05-2.54). Among African-American men who have sex with other men or both men and women but are not self-identified as gay or bisexual, alcohol use and drug transactions have been shown to foster same-sex sexual activities, allowing and rationalizing unprotected and same-sex activities.

A study in South Africa looked at the sexual behavior of men and women who were HIV-infected and who drank alcohol. For six weeks, sexual behavior and alcohol consumption were assessed daily by phone interviews. Fifty-eight HIV-positive women and 24 HIV-positive men reported drinking an average of 6.13 drinks when they drank; they also reported 4927 sex events, of which 80.17% were unprotected, with 58% of unprotected sex events occurring with HIV-negative or unknown HIV status partners. It was calculated that an estimated 2.95 incident HIV infections occurred during the study. Drinking alcohol before sex by either or both partners increased the proportion and number of subsequent unprotected sex events when the quantity of alcohol consumed corresponded to moderate or higher drinking. Prevention efforts need to address reducing alcohol-involved unprotected sex among both HIV-negative and HIV-positive persons.

One intervention, also in Cape Town, South Africa, tried to decrease risky behaviors among persons who imbibe alcohol in an informal setting. The participants (117 men, 236 women) were randomized to attend either a one-hour HIV/alcohol information/education control group versus a three-hour theory-based behavioral HIV-alcohol risk-reduction intervention that focused on skills

training for sexual negotiation and condom use. Among those who were light or moderate drinkers, the intervention showed a decrease in risky sexual behavior at three months but not six months after the intervention.

The relationship between alcohol intake and adherence to HIV medications has been studied extensively. A recent publication by Parsons et al analyzed the relationship between these two factors in 272 HIV-infected women and men with identified alcohol problems, evaluating the adherence to HIV medications over a fourteen day period. On days in which alcohol was consumed, there was almost nine times higher odds of medication nonadherence, with each drink increasing the odds by 20%. Individuals with strong and rigid beliefs about the importance of strict medication adherence were significantly more affected by each dose of alcohol with more complex regimens showing more effects of having one or more drinks. This study clearly demonstrates the need to assess for adherence issues in patients identified as having a problem with alcohol. An additional recent study by Applebaum et al did not show the same effect in men but only in women.

Braithwaite et al, in a study of over 3000 VA patients in New England, evaluated the effects of quantity and frequency of alcohol intake and adherence to medications among groups of HIV-infected and HIV-negative patients over a 30-day period. Nonadherence was assessed as number of days with $\geq$ 1 dose missed or $\geq$ 2 hours tardiness in dosing; significant nonadherence was defined as $\geq$ 5% absolute increase in proportion of days with missed nonadherence. Quantity-based categorization showed a 3.2-fold increase, self-reported impairment-based categorization a 3.6-fold increase, and quantity adjusted for mean daily consumption a 4.6-fold increase. They demonstrated that alcohol use was associated with clinically significant nonadherence at **two standard drinks for HIV-infected persons versus four standard drinks for HIV-negative participants.** This study demonstrated the need to counsel HIV-positive patients that daily consumption of even two alcohol-based drinks may lead to an increase in inadherence to their antiretroviral medication regimen.

Active depression has also been shown in innumerable studies to be a strong predictor of inadherence to HIV therapy. Sulllivan *et al* showed recently that heavy alcohol use and alcohol dependence were associated with a higher score on the Center for Epidemiologic Studies Depression Scale (CES-D), indicating increased incidence of depression. Upon further in-depth analysis, this association between alcohol use and depression incidence continued to be demonstrated primarily in the alcohol dependence group and less so in the heavy alcohol use group. By increasing the incidence of depression, alcohol dependence will affect the patient's ability to adhere to his/her HIV regimen, leading to advancement of disease and development of a resistant strain of HIV.

Alcohol use may actually influence the effects of HIV disease directly. In a study by Marcondes et al involving SIV and rhesus macaques, chronic alcohol ingestion by the monkeys resulted in a reduction in the number of circulating CD4+ T-cells, as well as an increase in monocytes expressing the CCR5 co-receptor. Samet et al, in a study involving 595 HIV-infected humans prospectively over a seven year period, assessed the effects of alcohol consumption on CD4 cell counts and HIV viral loads. The study controlled for factors such as depressive

symptoms and adherence, as well as stratified patients based on antiretroviral therapy (ART) use. This study showed an average decrease of 48.6 cells/mL for HIV-infected patients who drank alcohol heavily but who were not on ART as compared to those who did not have heavy alcohol consumption, though the same association was not found in the group of patients who were on ART. No effect on HIV viral loads were seen in either group.

In summation, prevention programs for both HIV-negative and HIV-positive populations need to address the role alcohol use plays in increasing risky behaviors for HIV exposure, especially in the heavy using and alcohol dependent clients. All members of the multi-disciplinary teams that care for HIV-infected clients need to assess alcohol use on a regular basis, using screening techniques such as the CAGE questions, and patients need to be counseled when beginning or changing medications on the association of heavy alcohol use and poor adherence to HIV therapy, as well as the effects alcohol can potentially have on CD4 counts, especially in those who are not on HAART therapy.❖

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Ronald Wilcox is Principal Investigator/Program Director, Delta Region AETC; Assistant Professor of Internal Medicine and Pediatrics, Section of Infectious Diseases, LSU Health Sciences Center