



High Prevalence of Unhealthy Alcohol Use Among Persons with HIV, Viral Non-suppression and Any Alcohol Use in Mbarara, Uganda: A Brief Report

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Abstract

Unhealthy alcohol use is associated with HIV viral non-suppression. It is unclear how common unhealthy alcohol use is among non-suppressed persons with HIV (PWH) who drink alcohol. We conducted chart reviews to recruit PWH in Uganda with recent viral non-suppression for a study on the efficacy of gabapentin for promoting viral suppression among those with unhealthy alcohol use. Of the 288 PWH screened, 87% self-reported unhealthy alcohol use on the Alcohol Use Disorders Identification Test-Consumption and 73% tested positive for urine ethyl glucuronide. These data suggest that alcohol interventions are needed among Ugandan PWH with viral non-suppression and who drink.

Keywords HIV · Sustained virologic response · Alcohol drinking · Uganda

Introduction

Uganda has been highly impacted by the HIV epidemic. In 2024, there were 1.5 million persons with HIV (PWH) in the country, impacting 4.9% of the population aged 15 to 49 [1]. Achieving viral suppression is imperative for improving individual health outcomes. Further, achieving and maintaining viral suppression eliminates the risk of sexual transmission, which is the most common route of HIV transmission globally [2]. This concept is known as treatment as prevention (TasP) [2]. Achieving and maintaining viral suppression relies on consistent adherence to antiretroviral therapy (ART). In Uganda in 2024, 85% of PWH were on ART and 82% were virally suppressed at their last viral load [1]. To realize the Joint United Nations Program on HIV/AIDS's goal of increasing rates of viral suppression to 95% among PWH who are on ART, barriers to viral suppression must be identified and addressed [3].

Like HIV, alcohol use is common in Uganda; per capita consumption was 12.2 L of pure alcohol in 2023 [4]. Although much of the population does not engage in alcohol use, those who do, tend to drink at unhealthy levels. Of adults who drank any alcohol, heavy episodic drinking was reported by 57% and 26% met criteria for alcohol use disorder [4]. Studies within the country indicate that alcohol use is more common among PWH compared to persons without HIV [5]. Further, high levels of alcohol use are associated with failure to adhere to ART and ultimately failure to achieve viral suppression [6]. In addition to the indirect impact on viral suppression via poor ART adherence, alcohol use may directly influence viral suppression by interfering with the immune system and suppressing immune function [7].

Mbarara, Uganda, located in the southwestern part of the country, has a higher prevalence of HIV than the national average (4.9% nationally vs. 7.5% in Mbarara and 9.9% in Mbarara City), but a lower proportion of the population

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reported alcohol use within the region (8.1%) [4, 8]. Other studies in Mbarara and neighboring regions have reported that unhealthy alcohol use is common among PWH [9–11]. However, it is unclear whether the pattern of alcohol use in the general population (i.e., those who drink tend to do so at unhealthy levels) applies to PWH with non-suppression. The purpose of the present study is to describe the prevalence of unhealthy alcohol use, assessed via self-report and biomarker, among PWH with an unsuppressed viral load who reported any alcohol use during screening for the Gabapentin to Reduce Alcohol and Improve viral Load suppression (GRAIL) Study.

Methods

Parent Study

The GRAIL Study is a National Institute on Alcohol Abuse and Alcoholism-funded clinical trial (NCT05443555). The goal of the study is to assess the effectiveness of gabapentin to reduce alcohol use and increase the likelihood of achieving viral suppression among PWH with viral non-suppression at enrollment [12]. Gabapentin has shown benefit in reducing heavy drinking days in other populations [13, 14]. Gabapentin inhibits excitatory neurotransmission in the amygdala and allows for restoration of GABA-glutamate balance, effectively mitigating withdrawal symptoms and cravings for alcohol. Also, gabapentin is thought to support alcohol reduction by treating some types of pain and anxiety, which may be motivating alcohol use [15–17]. Further, gabapentin is widely available as a generic drug. GRAIL recruitment began on November 20, 2023. The present paper focuses on those screened through February 28, 2025, when screening for study eligibility was only conducted via chart review. After this date, screening procedures were expanded to include referrals from clinic staff and peers based on their knowledge of patients' alcohol use.

Screening for the GRAIL study occurred at two clinics in Mbarara, Uganda. The first clinic was located in the Mbarara Regional Referral Hospital (MRRH), which provides primary and specialty HIV care to approximately 11,000 PWH. The second was the Mbarara City Council Health Centre (MCC), which provides HIV primary care to an estimated 5,800 PWH. The standard visit schedule for PWH with viral non-suppression involves monthly clinic visits, which can be extended to every other month if there are transportation barriers, until viral suppression is achieved. Alcohol screening as part of clinical practice occurred intermittently at both clinics, but it was not a systematic nor a regular practice at either clinic. When alcohol screening was conducted, it most routinely occurred during the intake

visit. Therefore, alcohol-related information was not a part of the chart pre-screening process described below.

Chart Pre-screening

As the first step in screening for GRAIL, clinic data managers at the two Mbarara clinical sites generated a list of potential participants. These potential participants were PWH who had upcoming clinic appointments, had a most recent viral load >200 copies/mL, and an initial HIV diagnosis occurring more than six months prior. The clinics' non-suppression registries were also reviewed by the recruitment team to identify additional PWH who had recent non-suppressed viral loads and had been living with HIV for at least 6 months. The list of potential participants identified via chart review and the registry was then provided to the Project Coordinator. A member of the research team who was also a clinic staff member then contacted individuals on the list by phone to invite them to the clinic for screening. The calls focused on potential participants' high viral loads, although alcohol use was sometimes mentioned and some individuals indicated that they were not drinking and therefore not interested in participating. Potential participants who had an upcoming clinic appointment were invited for screening on their existing clinic day. Those who did not have an upcoming appointment were invited to schedule a screening appointment at the clinic. If individuals volunteered that they did not drink at all during the screening appointment, then they were not invited to complete further screening. Otherwise, a research assistant obtained consent for further screening, and reviewed the potential participant's chart to confirm that the most recent viral load was >200 copies/mL. Study staff administered the screening questions and EtG urine test once eligibility based on the chart review was confirmed.

Screening Measures

Research assistants collected the screening data electronically using the Research Electronic Data Capture (REDCap) system and the measures were available in English and Runyankole. Self-reported alcohol use was assessed via the Alcohol Use Disorder Identification Test-Consumption (AUDIT-C), a brief screening for the spectrum of unhealthy alcohol use (i.e., risky drinking to alcohol use disorder), modified to assess alcohol use in the preceding three months [18]. Individuals had a positive AUDIT-C screen for unhealthy alcohol use if they scored three or more for women and four or more for men. Recent self-reported alcohol use was confirmed using a urine ethyl glucuronide (EtG) dipstick, which can detect alcohol use in the preceding one to three days depending on the amount of alcohol

consumed, and a positive result had a cutoff of greater or equal to 300 ng/mL. Participants who initially screened negative for urine EtG could be retested up to two times with at least a week between urine EtG tests.

Additional Measures

Other participant characteristics collected during screening included age, sex, time since HIV diagnosis, and whether they had taken ART in the preceding 30 days. PWH who screened positive for unhealthy alcohol use on the AUDIT-C and screened positive for recent alcohol use (urine EtG), were offered enrollment in the study. Those who enrolled in GRAIL had dried blood spots collected during the baseline study visit. These samples were later tested for phosphatidylethanol (PEth), which is a biomarker of total alcohol use in the preceding two to four weeks. The primary purpose using PEth was to confirm pre-intervention alcohol use among GRAIL enrollees during the analysis phase of the trial. PEth results were not available at baseline and were not used to determine eligibility or allocation. Participants' alcohol use was classified as follows based on PEth: heavy or excessive (PEth $\geq$ 200 ng/mL), unhealthy (PEth 50–199 ng/mL), and no or low-level (PEth < 50 ng/mL) [19].

Analyses

All PWH screened on or before February 28, 2025 at MRRH or MCC were included in the present analyses. Descriptive statistics were generated to characterize the prevalence of unhealthy and recent alcohol use among PWH with a documented non-suppressed HIV viral load who completed the in-person screening.

Ethical Considerations

The study was approved by the Mbarara University of Science and Technology Research Ethics Committee (MUST-2022–668), the Uganda National Council for Science and Technology (HS2622ES), and the Boston Medical Center and Boston University Medical Campus Institutional Review Board (H-42904). As members of the research team are directors at some of the clinics where recruitment took place, the study also obtained approval from the Ministry of Health for these study activities. At clinics where no such conflict of interest occurred, administrative approval was sought and granted to recruit from their clinics. All potential participants who agreed to a screening visit gave written informed consent for their screening data to be collected by the research team. The screening consent form included information that the study would be conducted among people “who drink alcohol heavily”. During screening,

potential participants were provided with refreshments and those who had to return to the clinic to be screened were reimbursed for their travel expenses depending on the distance travelled. If enrolled, participants were compensated with two bars of soap or one bar of soap and 1 kg of rice per study visit.

Results

Overall, 288 PWH from the MRRH or MCC were screened for the GRAIL study between November 20, 2023, when study recruitment began, and February 28, 2025, when recruitment was expanded to include staff referral based on alcohol use. Of the 288 screened, the median age was 38 years (Q1–Q3 32–47), 64% were men, and the median time since their HIV diagnosis was 8 years (Q1–Q3 4–13). The AUDIT-C was administered to 286 individuals, of whom the vast majority (87%) screened positive for unhealthy alcohol use in the preceding three months. A urine EtG test was administered to 255 individuals, of whom the majority (60%) tested positive on the first test. The cumulative positivity for urine EtG was 73% after up to two repeat tests. See Table 1.

Discussion

The goal of this analysis was to estimate the prevalence of unhealthy alcohol use among PWH who drink any alcohol and had recently documented HIV viral non-suppression in a high HIV prevalence setting. The vast majority of PWH with viral non-suppression assessed in the GRAIL study reported unhealthy alcohol use and the majority had biomarker confirmed recent alcohol use.

Our estimates of unhealthy alcohol use are higher than what other studies recruiting PWH for alcohol interventions in the region have reported when assessing alcohol use via self-report. One Mbarara study recruiting PWH as participants, irrespective of viral load status and current alcohol use, found that 43% were not eligible due to a negative AUDIT-C [20]. However, another study of PWH at risk for viral non-suppression found that 78% of those screened had a positive AUDIT-C, which is much closer to the present estimate [21]. Our EtG findings are slightly higher than another intervention study in the region, which provided financial incentives for abstinence from alcohol and anti-tuberculosis (TB) medication adherence among PWH with latent TB. During the screening process, 63% of PWH who screened positive via the AUDIT-C also had a positive urine EtG test [22]. The methods used in these studies also relied on clinical care sites, so differences between our estimates

Table 1 Demographics of Ugandan PWH with non-suppressed viral load screened for the GRAIL Study prior to March 1, 2025 (n=288)

Characteristic	PWH who completed GRAIL screening <i>n</i> (%)
Sex	
Male	183 (63.8%)
Female	104 (36.2%)
Age median (Q1, Q3)	38 (32, 47)
Years since HIV diagnosis median (Q1, Q3)	8 (4, 13)
On ART ^a	285 (99.3%)
AUDIT-C ^b	
Positive	249 (87.1%)
Negative	37 (12.9%)
Initial urine EtG result (n=255) ^c	
Positive ^d	152 (59.6%)
Negative	103 (40.4%)
First repeat urine EtG result (n=86)	
Positive ^d	27 (31.4%)
Negative	59 (68.6%)
Second repeat urine EtG result (n=43)	
Positive ^d	8 (18.6%)
Negative	35 (81.4%)
Participants with any positive urine EtG result	187 (73.3%)
Phosphatidylethanol (n=113) ^e	
<50 ng/mL	16 (14.2%)
50–199 ng/mL	23 (20.4%)
≥200 ng/mL	74 (65.5%)

^aSelf-reported taking ART at least once in the 30 days preceding screening

^bAUDIT-C was positive if the score was ≥3 for women or ≥4 for men

^cBefore June 25, 2024 only PWH who had a positive AUDIT-C were screened via urine EtG

^dCutoff for a positive urine EtG was ≥300 ng/mL

^eOnly collected for those with positive AUDIT-C and urine EtG and who enrolled in the GRAIL trial

and prior studies could be explained by the viral non-suppression status of this cohort.

Additionally, our estimates are higher than those found in non-intervention studies that sought to estimate the prevalence of alcohol use in the population of PWH. In the rural regions of central Uganda, 53% of PWH with viral non-suppression who reported any alcohol use had positive AUDIT-C scores [5]. Some of these studies included PWH who were not on ART and those who had previously not known their HIV status, both of which are associated with higher levels of alcohol use [9, 23]. The very high prevalence of unhealthy alcohol use in the present study among individuals were on ART and had been diagnosed at least 6 months previously, highlights the need to consider and potentially address alcohol use in PWH who report any alcohol consumption and who do not achieve viral load suppression. The markedly greater amount of alcohol use in our study sample, coupled with the high rates of HIV in Mbarara,

suggests that interventions for alcohol use are potentially valuable within this population to mitigate alcohol-related harms and improve viral suppression.

These alcohol and viral load measures were cross-sectional so we cannot determine whether their non-suppressed status was attributable to their alcohol use or other factors. However, a large body of literature implicates alcohol as a major contributor to poor HIV care engagement, suboptimal ART adherence, and ultimately viral non-suppression, which would suggest that at least some of the HIV non-suppression in this population can be partially explained by alcohol use [7]. In addition to HIV-related harms, alcohol use is a contributing factor in the development of many chronic health conditions, a growing concern as the global population of PWH ages [24]. Further, alcohol use increases the risk of developing active TB infection, the leading cause of death among PWH [25]. These other deleterious consequences further support the case for alcohol interventions within this population with very high rates of unhealthy alcohol use.

This study has limitations. First, individuals may have overstated their alcohol use to participate in the study since they were told during screening that the study was about alcohol. Although, most PWH who self-reported at-risk alcohol use had biomarker confirmed recent alcohol use, and of those tested for PEth (i.e., those with positive AUDIT-C and EtG), the PEth levels were high. Alternatively, informal discussions between research staff and potential participants revealed that one motivation for some participants was the desire to achieve viral suppression, which may have led to more honesty about their alcohol use in the hopes of accessing the study medication. Medications for alcohol use are largely unavailable in this setting despite high levels of interest among PWH who drink [26]. Second, our sample may overrepresent PWH with unhealthy alcohol use if PWH with low levels of alcohol use were less likely to agree to participate in screening. Third, our findings may not be generalizable to PWH who are not in care since the sample was drawn from PWH with upcoming HIV care appointments. It is well known that alcohol use is associated with lower engagement in HIV care [27].

In conclusion, among Ugandan PWH with viral non-suppression who drink any alcohol, at-risk alcohol use was exceedingly common when alcohol use was assessed via self-report and biomarker. These findings highlight the potential opportunity to utilize alcohol-related interventions among PWH in southwestern Uganda and potentially other countries with both substantial HIV prevalence and alcohol consumption. Additionally, better integration of HIV and alcohol-related care within healthcare settings may lead to greater benefits for PWH, but further study is needed to

assess how such programs could be designed and implemented in this setting.

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Data Availability Access to the data may be requested by contacting the URABN ARCH Consortium Data & Sample Repository. Please see here for more information: <https://sites.bu.edu/urbanarch/resource/s/data-sample-repository/>.

Declarations

Competing Interests The authors have no financial or non-financial interests related to this work.

Ethical Approval The Gabapentin to Reduce Alcohol and Improve viral Load suppression (GRail) Study was approved by the Mbarara University of Science and Technology Research Ethics Committee (MUST-2022-668), the Uganda National Council for Science and Technology (HS2622ES), and the Boston Medical Center and Boston University Medical Campus Institutional Review Board (H-42904).

Consent to Participate All participants provided written informed consent prior to participation.

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