Associations of alcohol consumption with viral suppression and all-cause mortality

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Antiretroviral Therapy Cohort Collaboration (ART-CC) and the Consortium to improve OutcoMes in HIV/Aids, Alcohol, Aging, and multi-Substance (COMpAAAS)

Background and aims:

- Unhealthy alcohol use may lead to higher morbidity and mortality among people living with HIV (PLHIV).
- Understanding the associations between alcohol use and mortality among PLHIV can enable the creation of targeted interventions.
- We investigated associations of alcohol intake with viral suppression and all-cause mortality.

Methods:

- Data were assembled from five cohorts participating in both the Antiretroviral Therapy Cohort Collaboration and the Consortium to improve OutcoMes in HIV/AIDS, Alcohol, Aging, and multi-Substance (COMpAAAS) that provided AUDIT-C alcohol measures
- Eligible PLHIV were aged ≥16 years and started antiretroviral therapy (ART) 1996-2018.
- AUDIT-C alcohol measures (https://www.hepatitis.va.gov/alcohol/treatment/audit-c.asp) were categorised as no drinking and low (AUDIT-C score 1-4) [reference group], medium (5-8), and high (9-12) intake.
- The date of first AUDIT-C measure following the start of ART was taken as baseline. Follow-up was censored at the first of loss to follow-up or death.
- We used logistic regression models to estimate adjusted odds ratios (aOR) for detectable viral load at baseline.
- We used Cox survival models to estimate adjusted hazard ratios (aHR) for virological failure among those with undetectable baseline viral load (censored at 3 years after baseline) and for all-cause mortality among the whole sample (with no limitation on follow-up).
- Models were adjusted for baseline CD4 count, age, gender and transmission risk group with mortality analyses additionally adjusted for baseline viral load.
- All models were either stratified or adjusted for cohort.

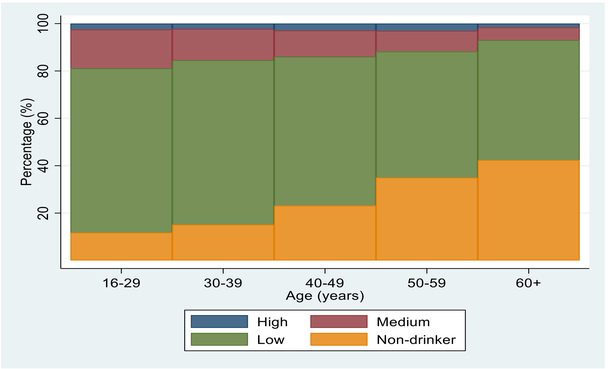


Figure 1: Age category by alcohol consumption category at the first AUDIT-C measure post-ART start

	Alcohol consumption category			
	Non-drinker	Low	Medium	High
Total	9475 (28.5%)	19585 (59.0%)	3298 (9.9%)	848 (2.6%)
Sex				
Male	9041 (30.2%)	17096 (57.0%)	3060 (10.2%)	786 (2.6%)
Female	434 (13.5%)	2489 (77.2%)	238 (7.4%)	62 (1.9%)
Transmission risk group*				
MSM	106 (1.9%)	4281 (75.2%)	1191 (20.8%)	122 (2.1%)
IDU	55 (6.0%)	629 (68.3%)	177 (19.2%)	60 (6.5%)
Het	205 (5.1%)	3173 (78.4%)	550 (13.6%)	117 (2.9%)
HIV-1 RNA viral load				
Undetectable	6335 (27.7%)	13790 (60.4%)	2234 (9.8%)	475 (2.1%)
Detectable	3140 (30.3%)	5795 (55.9%)	1064 (10.3%)	373 (3.6%)
CD4 count (cells/μL)				
<50	304 (36.8%)	407 (49.2%)	84 (10.2%)	32 (3.9%)
50-99	289 (36.9%)	380 (48.5%)	69 (8.8%)	46 (5.9%)
100-199	844 (34.1%)	1336 (54.0%)	216 (8.7%)	79 (3.2%)
200-349	1805 (32.7%)	3024 (54.7%)	524 (9.5%)	176 (3.2%)
350-499	1984 (28.1%)	4196 (59.4%)	725 (10.3%)	165 (2.3%)
≥500	4249 (25.7%)	10242 (62.0%)	1680 (10.2%)	350 (2.1%)
Death during follow-up				
Did not die	7659 (26.3%)	17804 (61.1%)	3016 (10.4%)	671 (2.3%)
Died	1816 (44.8%)	1781 (43.9%)	282 (7.0%)	177 (4.4%)

Table 1: Characteristics and subsequent mortality outcomes by alcohol consumption category at the first AUDIT-C measure post-ART start
*Transmission risk group unknown for many patients

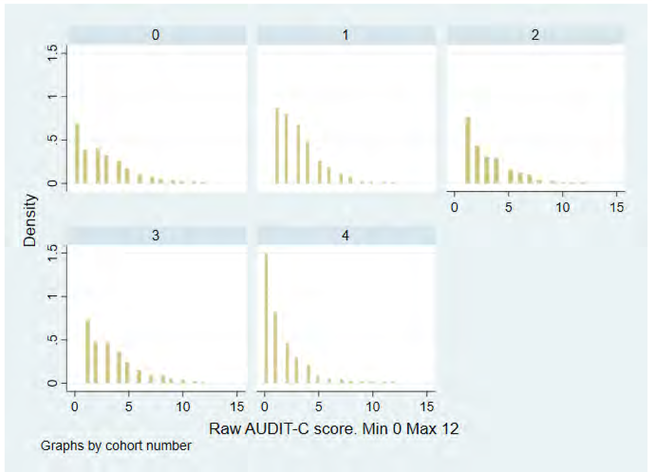


Figure 2: AUDIT-C score distribution by cohort at the first AUDIT-C measure post-ART start

Results:

- Of 33,206 PLHIV, 9,475 (28.5%) were non-drinkers, whilst 19,585 (59.0%), 3,298 (9.9%), and 848 (2.6%) had low, medium, and high alcohol intake, respectively.
- Characteristics stratified by alcohol consumption category at the first AUDIT-C measure post ART start are shown in table 1 and figure 1.
- There is high heterogeneity in the reporting of `alcohol consumption between cohorts (figure 2).

Viral load

- PLHIV with medium and high alcohol intake had higher odds of detectable viral load at baseline (aORs 1.14 [95%CI 1.05, 1.24] and 1.57 [1.36, 1.83], respectively) compared with low intake (figure 3, left panel).
- Among those with undetectable viral load at baseline (n=22,834), medium- and high-drinkers had faster time to detectable viral load (4,974 failures in total) than those with low intake, aHRs 1.13 (1.02, 1.26) and 1.60 (1.35, 1.90), respectively (figure 3, middle panel).

Mortality

- 4,056 PLHIV died during 183,683 person-years of follow-up.
- Subsequent mortality outcomes stratified by alcohol consumption category at the first AUDIT-C measure post ART start are shown in table 1.
- For mortality, aHRs compared with low intake were 1.33 (1.24, 1.42) for non-drinkers, 1.20 (1.06, 1.36) for medium intake, and 1.99 (1.70, 2.33) for high intake (figure 3, right panel).

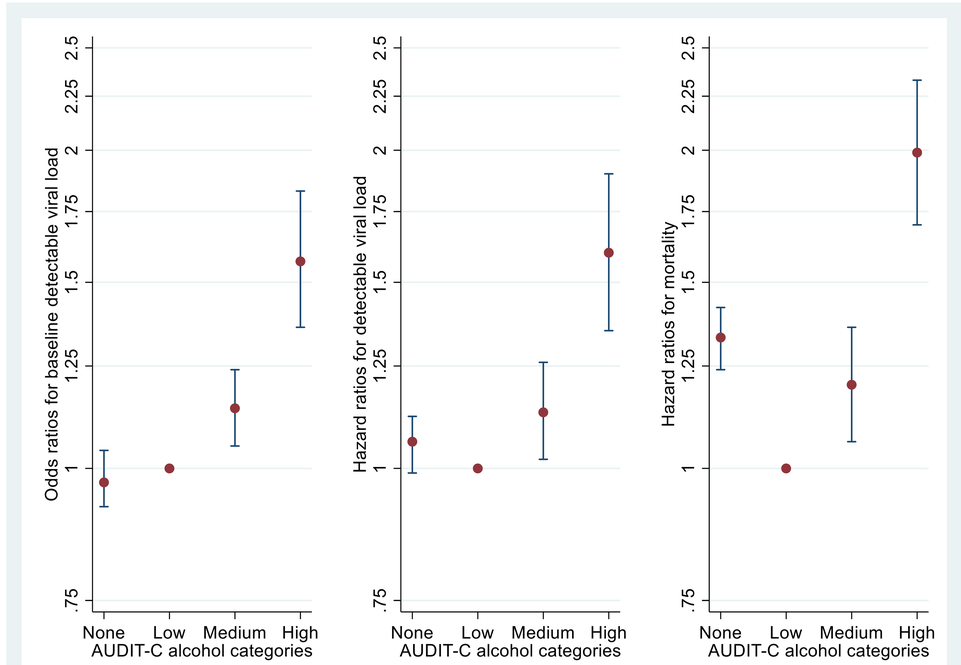


Figure 3 (above): Adjusted associations of AUDIT-C alcohol intake categories with (a) viral suppression at baseline, (b) time to detectable viral load, and (c) time to all-cause mortality

Conclusions:

- Among PLHIV, high or medium alcohol intake is associated with higher mortality than low intake.
- Higher mortality risk for non-drinkers is likely due to harms from past drinking.
- PLHIV with medium or high alcohol intake were more likely than those with low intake to have a detectable viral load at baseline.
- Interventions to reduce unhealthy alcohol use among PLHIV should be considered.

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