Effect of Alcohol on HIV-associated Frailty Trajectories

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Introduction

- Frailty is a geriatric syndrome of accelerated aging characterized by loss of multi-system physiologic reserve and increased vulnerability to stressors.
- HIV infection is associated with frailty and increased prevalence of frailty persists despite effective viral suppression with HAART.
- Alcohol use disorders (AUD) and other forms of hazardous alcohol consumption represent a common comorbidity within this population.
- A prior 2020 cross-sectional analysis of the New Orleans Alcohol use in HIV (NOAH) study cohort reported the association of lifetime alcohol exposure (LAE) with frailty in PWH.
- Paradoxically, maximal frailty was observed in presently alcohol-abstinent participants with highest LAE.

Hypotheses

1. **Active alcohol use accelerates unfavorable change in frailty trajectories.**
2. **Baseline frailty status and LAE moderate the effects of alcohol consumption on frailty**

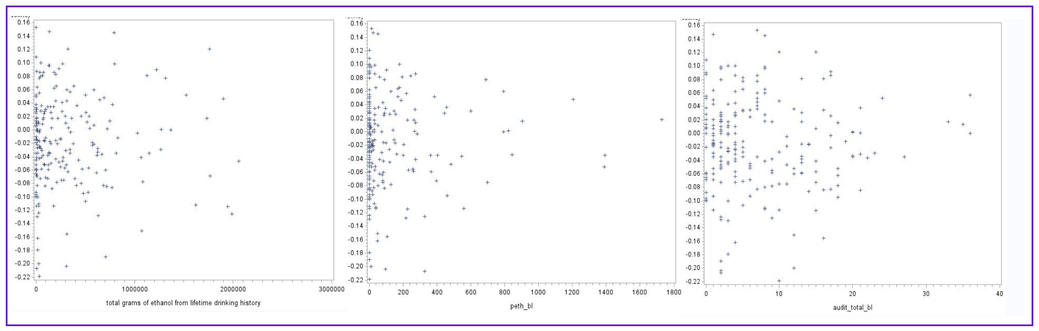
Methods

- Follow up data collected from NOAH participants (n=237) within 15-45 months post baseline testing (mean time = 31.3 months).
- 58-item deficit index (DI-58) scores were generated and clustered into discrete trajectories representing decreased (<-0.02), stable (-0.02 to 0.02), and worsened (>0.02) frailty.
- Correlational analysis with baseline alcohol metrics (LAE, PEth, and AUDIT).
- Multinomial logistic modeling performed to adjust for covariate demographic features.
- Pearson correlation coefficients generated to compare cohort-level DI-58 change with PEth and AUDIT.

Change from Baseline at the Cohort Level

Factors	baseline		30 month		Difference (30 m-baseline)		
	N	Mean± SD	N	Mean± SD	N	Mean± SD	Paired t-test P-value
Age	237	49.4± 9.8	237	52.0± 9.9	237	**2.6± 0.6**	**<0.001**
Viral Load (copies/mL)	217	7941.2± 60407.5	-	-	-	-	-
cd4 count (cells/mm^3)	223	566.6 ± 309.2	128	631.3± 336.0	125	**60.2± 184.6**	**<0.001**
cd8 count	223	796.0± 342.7	128	836.0± 374.6	125	25.7± 291.9	0.327
AUDIT Total (0-40)	237	7.5± 7.6	237	6.5± 7.0	237	**-1.0± 6.2**	**0.014**
Audit-C	237	3.9± 3.1	237	3.6± 3.1	237	-0.3± 3.0	0.106
PEth (ng/mL)	229	121.0± 246.9	180	99.4± 198.4	174	**-10.5±167.8**	**0.412**
Total kg of ethanol from lifetime drinking history(LDH)	237	334.0± 452.8	-	-		-	-
DI-58 (0.0 - 1.0)	224	0.174± 0.086	232	0.158± 0.085	222	**-0.016± 0.068**	**0.0006**
Frailty using physical activity measures (range: 0-5)	225	1.0± 1.0	205	1.2± 1.0	197	**0.2±1.2**	**0.011**

DI-58 Change vs. LAE, PEth, & AUDIT



DI-58 Trajectories & Alcohol Use Metrics

	Decreased frailty (DI58< -2%)	Stable frailty (DI58, -2% to 1.9%)	Increase frailty (DI58, >=2%)	
Number of participants	105 (47.3)	53 (23.9)	64 (28.8)	
Baseline alcohol factor	*mean± SD*	*mean± SD*	*mean± SD*	*p-value*
LAE (kg)	**345.1± 456.4**	253.4± 391.3	**333.8± 436.7**	0.156
PEth (ng/ml)	123.2± 245.3	**127.9± 301.7**	**127.2± 219.2**	0.992
AUDIT (0-40)	**7.6 ± 6.6**	**7.4± 9.2**	6.7± 6.7	0.751

Covariate Adjustment & Correlation Coefficients

Type III Analysis of Effects (Significant Only)		
Effect	Wald Chi-Square	Pr > Chi-Square
Age (DI-58 vs. LAE)	**5.5077**	**0.0637**
Age (DI-58 vs. PEth)	**7.4448**	**0.0242**
Age (DI-58 vs. AUDIT)	**7.4679**	**0.0239**

Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

	dif_di58per	dif_audit	dif_peth
dif_di58per changes of DI58% (30m-baseline)	1.00000 222	-0.00214 0.9747 222	-0.02955 0.7004 172
dif_audit	-0.00214 0.9747 222	1.00000 237	0.12407 0.1029 174
dif_peth	-0.02955 0.7004 172	0.12407 0.1029 174	1.00000 174

Results & Conclusion

- At the cohort-level, decrease in DI-58 frailty score associated with both decreasing PEth and AUDIT score over approximately 30 months.
- These changes coincide with an average increased CD4+ lymphocyte count.
- Division of cohort by absolute change in DI-58 reveal disparate profiles that depart from cohort behavior, but do not achieve statistical significance.
- Adjusting for demographic features, smoking status, and HIV-associated measures at baseline, age alone differentiates itself as having a significant effect on the tested relationships between DI-58 and alcohol use measures.
- Changes in both PEth and AUDIT are weakly correlated with change to DI-58 over 30 months, but do not reach statistical significance at the cohort level.

Limitations & Next Steps

- Current DI-58 trajectory groups determined by absolute DI-58 score change independent of baseline score.
  - e.g. Both the stably non-frail and stably frail may be grouped together within current parameters.
- New primary DI-58 trajectories groups characterized by baseline frailty status (non-frail, pre-frail, frail) and alcohol usage profile (never drinker, active, currently abstinent) to be generated.
- Further assessment of HIV-specific measure changes within trajectory groups to be pursued.
- Creation of trajectory groups using the PFI for cross comparison using the above parameters.

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