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Cardiometabolic Risk Profiles in HIV and Nonalcoholic Fatty Liver

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Background

- Non-alcoholic fatty liver disease (NAFLD) is the most common cause of chronic liver disease worldwide, causing considerable morbidity and mortality[1]
- Human immunodeficiency virus (HIV) is a global health issue, impacting >37 million people[2]
- NAFLD is common among persons living with HIV (PLWH) and is more likely to progress to NAFLD-related fibrosis or cirrhosis than in those without HIV[3]
- Both NAFLD and HIV are independently associated with increased incidence of metabolic syndrome, including dyslipidemia, hyperglycemia, and obesity[4]
- Both NAFLD and HIV are also independently associated with increased cardiovascular risk and mortality[5, 6]
- It is currently unclear whether the combination of NAFLD and HIV leads to worsened metabolic and cardiovascular disease (CVD) profiles than either condition alone

Hypotheses

- We hypothesized that individuals with both HIV infection and NAFLD have distinct and worse cardiometabolic profiles than those with HIV alone.

Methods

- We performed a case control study to compare cardiometabolic profiles in PLWH with and without NAFLD
- Search of the Partners HealthCare Research Patient Data Registry identified PLWH with (cases) and without NAFLD (controls)
- **Definition of NAFLD (Cases)**: Hepatic steatosis on imaging or biopsy
- **Definition of Absence of NAFLD (Controls)**: Normal liver on imaging or biopsy
- **Exclusion Criteria**: Individuals with significant alcohol use or viral hepatitis B or C were excluded
- **Outcomes**
- **Adverse Cardiometabolic Profile:** ≥4 components of the metabolic syndrome
- **Coronary Artery Disease (CAD):** ICD-10 diagnosis of CAD
- **Cardiovascular Disease (CVD):** CAD and/or cerebral vascular accident

Table 1: Baseline Characteristic Differences between HIV with NAFLD versus HIV controls

Demographics	HIV and NAFLD (N=102)	HIV Controls (N=139)	P-value
Gender			0.97
Male, n (%)	78 (76%)	106 (76%)	
Female, n (%)	24 (24%)	33 (24%)	
Race			0.138
Black, n (%)	15 (15%)	37 (27%)	
White, n (%)	61 (60%)	72 (52%)	
Hispanic, n (%)	13 (13%)	18 (13%)	
Others, n (%)	13 (13%)	12 (9%)	
Age, years (mean ± SD)	54 ± 9.6	55 ± 6.8	0.34

Table 2: Differences in Cardiometabolic Risk Profiles and Cardiovascular Outcomes between HIV with NAFLD versus HIV controls

Risk Factors	HIV and NAFLD (n=102)	HIV Controls (N=139)	P value
BMI, kg/m^2 (mean ± SD)	31.0 ± 6.3	27.8 ± 5.3	**<0.0001**
Diabetes Mellitus			0.161
Yes, n (%)	20 (20%)	18 (13%)	
No, n (%)	82 (80%)	121 (87%)	
Hemoglobin A1C, % (mean +/- SD)	4.3 +/- 0.68	5.0 +/- 6.96	0.29
Hypertension			**0.008**
Yes, n (%)	53 (52%)	48 (35%)	
No, n (%)	49 (48%)	91 (65%)	
Smoking			0.218
Yes, n (%)	11 (11%)	23 (17%)	
No, n (%)	89 (89%)	115 (83%)	
Cholesterol			
Total Cholesterol, mg/dL (mean ± SD)	182 ± 45	188 ± 43	0.30
HDL, mg/dL (mean ± SD)	40 ± 15	51 ± 19	**<0.0001**
LDL, mg/dL (mean ± SD)	101 ± 36	109 ± 35	0.116
Triglycerides, mg/dL (mean ± SD)	255 ± 276	141 ± 75	**<0.0001**
Coronary Artery Disease			0.089
Yes, n (%)	9 (%)	5 (4%)	
No, n (%)	93 (91%)	133 (96%)	
Cardiovascular Disease			**0.034**
Yes, n (%)	14 (14%)	8 (6%)	
No, n(%)	88 (86%)	131 (94%)	

Results

- PLWH and NAFLD had a higher prevalence of hypertension, lower HDL and higher triglyceride levels than PLWH without NAFLD(Table 2)
- No differences by NAFLD status was seen in LDL, total cholesterol or A1C levels.
- NAFLD, among PLWH, was associated with an adverse cardiometabolic profile independent of age, gender, tobacco use and BMI (OR 2.4, p=0.02).
- NAFLD was associated with a trend toward a higher prevalence of CAD (9% vs. 4%, p=0.089)
- CVD was significantly more common among those with NAFLD compared to those without (14% vs. 6%, P=0.034)
- The presence of NAFLD was associated with an increased risk of CVD (OR 3.02, p=0.02) after adjustment for BMI and for diabetes

Discussion

- Among PLWH, NAFLD is independently associated with adverse cardiometabolic profiles and cardiovascular disease.
- Large, prospective studies are needed to better elucidate the relationship between NAFLD and CVD in PLWH and identify therapeutic targets.

References

1. Chalasani N., Younossi Z., Lavine J.E., Diehl A.M., Brunt E.M., Cusi K., et al. The diagnosis and management of non-alcoholic fatty liver disease: practice guideline by the American Association for the Study of Liver Diseases, American College of Gastroenterology, and the American Gastroenterological Association. Am J Gastroenterol 2012; 107: pp. 811-826.
2. "HIV/AIDS." World Health Organization, 2018, www.who.int/gho/hiv/en/.
3. Vodkin I, Valasek MA, Bettencourt R, Cachay E, Loomba R. Clinical, biochemical and histological diff erences between HIV-associated NAFLD and primary NAFLD: a case-control study. Aliment Pharmacol Ther 2015; 41: 368–78.
4. Ahmed MH, Husain NE, Malik A, Woodward C, Mital D. Non-alcoholic fatty liver disease and HIV/AIDS: A new way of modulation of cardiovascular risk. AIDS Rev. 2017: 19(4): 190-197.
5. Lonardo A, Ballestri S, Guaraldi G, Nascimbeni F, Romagnoli D, Zona S, Targher G. Fatty liver is associated with an increased risk of diabetes and cardiovascular disease: Evidence from three different disease models: NAFLD, HCV, and HIV. World J Gastroenterol. 2016 Nov 28; 22(44): 9674-9693.
6. Ballocca F., D'Ascenzo F, Gili S, Marra WG, Gaita F. Cardiovascular disease in patients with HIV. Trends in Cardiovascular Medicine 2017 27(8): 558-563.