CSP3.05

Factors associated with non-alcoholic hepatic steatosis among hepatitis C (HCV) monoinfected and HIV/HCV co-infected adults

M Harris[1,3], W Zhang[1], L Tiamiyu[1], B Ganase[2], F Samad[2], V Lima[1,3], R Barrios[1,3], S Guillemi[1,3], J Montaner[1,3], M Hull[1,3]

1. BC Centre for Excellence in HIV/AIDS, 2. AIDS Research Program, St. Paul's Hospital, 2. University of British Columbia, Vancouver, BC

Background

- Hepatic steatosis (fatty liver) is a common finding in people with chronic liver disease, including hepatitis C (HCV) infection. In the presence of HIV infection, metabolic disorders and antiretroviral therapy (ART) may be additional contributing factors. [1-3]
- Hepatic steatosis can be assessed non-invasively by controlled attenuation parameter (CAP) simultaneously with transient elastography (TE). [4]
- In a prospective cohort study conducted in an HCV referral clinic, we examined prevalence and factors associated with steatosis amongst HCV-infected and HIV/HCV co-infected individuals undergoing TE.

Methods

Participants – Inclusion Criteria

- HCV-infected adults ≥19 years of age
- referred for TE between October 2013 and July 2015
- no contraindications to TE (e.g. pregnancy, implanted medical device)
- CAP score available (standard M probe used)

Participants – Exclusion Criteria

- non-infectious etiologies of liver disease e.g. hemochromatosis, Wilson disease, primary biliary cirrhosis, autoimmune hepatitis, alcoholic liver disease)
- heavy alcohol use, defined as answer to alcohol use questionnaire: frequency "5 or more times per week" and amount "7 or more drinks per day"

Data collection

- TE was performed by trained and certified personnel as recommended by the manufacturer (FibroScan; EchoSens, Paris, France)
- demographics and medical history (HCV, HIV if applicable, and relevant comorbid conditions) were collected by participant interview, and verified by chart review
- substance use history was obtained by standardized questionnaires
- height and weight were measured for calculation of body mass index (BMI)
- for HIV+ participants, ART history was obtained from the BC Centre for Excellence in HIV/AIDS Drug Treatment Program database

Steatosis definition [4]

Steatosis grade	Interpretation	Proportion of hepatocytes containing fat	CAP score (dB/min)
S0	No steatosis	≤10%	≤247
S1/2/3	Steatosis	≥11%	≥248

Statistical analysis

- Categorical variables were compared using Chi-squared or Fisher's exact test.
- Continuous variables were compared using Wilcoxon rank sum test.
- Logistic regression modelling was used to examine factors associated with steatosis.

Ethical approval

- The protocol and informed consent were approved by the UBC/Providence Health Care Research Ethics Board (H13-02300).

Results

Baseline characteristics of study participants

	All (N)	No steatosis (S0)	Steatosis (S1/2/3)	p-value
N	209*	155	54	
HIV/HCV coinfected	144 (69%)	108 (70%)	36 (67%)	0.681
HCV monoinfected	65 (31%)	47 (30%)	18 (33%)	
Male	164 (78%)	120 (77%)	44 (81%)	0.532
Female	45 (22%)	35 (23%)	10 (19%)	
Age, years	51 (45-57)	50 (44-57)	52 (48-59)	0.047
BMI, kg/m2	24 (22-27)	23.8 (21.6-26.2)	26.0 (24.0-27.9)	<0.001
TE score, kPa	6.5 (5.0-10.0)	6.3 (4.9-10)	6.7 (5.6-10.4)	0.483
Diabetes	14 (7%)	6 (4%)	8 (15%)	0.009
Previous HCV treatment (pre-DAA)	35 (17%)	18 (12%)	17 (31%)	0.001
HBV coinfected	23 (11%)	20 (13%)	3 (6%)	0.187
Time since HCV diagnosis, years	11 (3-18)	10 (3-18)	12 (4-19)	0.522

Data shown are N (column %) or median (Q1-Q3)
*298 participants had TE, of whom 244 had CAP scores available. Of those, 35 were excluded from the analysis (9 for other liver disease, 26 for heavy alcohol use).

Factors associated with steatosis among all participants

Variable	Adjusted Odds Ratio	95% Confidence Interval
Age, per year	1.03	0.99-1.07
BMI, per kg/m2	1.08	1.01-1.18
Diabetes (yes vs. no)	4.90	1.50-15.98
Previous (pre-DAA) HCV treatment (yes vs. no)	3.65	1.55-8.57

Baseline characteristics of HIV/HCV co-infected participants

	All (N)	No Steatosis (S0)	Steatosis (S1/2/3)	p-value
N	144	108	36	-
Male	118 (82%)	87 (81%)	31 (86%)	0.453
Female	26 (18%)	21 (19%)	5 (14%)	
Age, years	50 (44-57)	50 (43.5-56.5)	51 (46.5-57)	0.271
BMI, kg/m2	24.1 (22.1-26.8)	23.6 (21.8-26.0)	26.2 (23.9-27.9)	0.001
TE score, kPa	6.4 (5.0-10.1)	6.3 (4.9-10)	6.6 (5.2-10.7)	0.548
Diabetes	9 (6%)	4 (4%)	5 (14%)	0.038
Previous (pre-DAA) HCV treatment	30 (21%)	15 (14%)	15 (42%)	<0.001
Time since HIV diagnosis, years	15 (9-20)	14 (9-19)	18 (8-29)	0.173
Duration of ART, years	11 (5-17)	10 (5-17)	12 (6-17)	0.416
Ever exposed to AZT, ddI, d4T, or ddC	72 (50%)	51 (47%)	21 (58%)	0.248
Ever exposed to any PI	109 (76%)	84 (78%)	25 (69%)	0.313

Data shown are N (column %) or median (Q1-Q3)

Factors associated with steatosis among HIV/HCV co-infected participants

Variable	Adjusted Odds Ratio	95% Confidence Interval
BMI, per kg/m2	1.07	0.99-1.16
Diabetes (yes vs. no)	6.14	1.43-26.32
Previous (pre-DAA) HCV treatment (yes vs. no)	5.57	2.06-15.06

Limitations

- This analysis may underestimate the prevalence of steatosis, since at the time CAP scores were only obtainable using the M probe. The XL probe, designed for use in obese patients (waist circumference >100 cm) was used in 18% of participants (54/298), whom we were therefore unable to include in this analysis.
- HCV genotype information was not available in the study database for most study participants. HCV genotype 3 is associated with higher rates of hepatic steatosis. [5]

Conclusions

- Hepatic steatosis was present in 26% overall and in 25% with HIV/HCV co-infection.
- Steatosis was associated with higher BMI, diabetes, and receipt of older (pre-DAA) HCV treatment, but not with age, gender, or HIV coinfection.
- Among HIV/HCV co-infected participants, steatosis was associated with diabetes and pre-DAA HCV treatment, but not with exposure to ART.

References
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