



# Low-moderate alcohol use is associated with a lower prevalence of non-alcoholic fatty liver disease in Hispanics/Latinos living in the US: Results from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL)

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## Objective

To examine the relationship between alcohol intake and non-alcoholic fatty liver disease (NAFLD) in a population-based cohort of Hispanics/Latinos living in the US.

## Introduction

NAFLD is common in the US and worldwide with a global prevalence of 20% to 30%.

Chronic liver disease is a major cause of morbidity and mortality in Hispanics/Latinos in the US with a higher incidence, more aggressive disease patterns, and less favorable treatment outcomes for many liver disorders compared with the non-Hispanic white population.<sup>1, 2</sup>

Alcohol use is a known risk factor for liver injury.

In contrast, some studies have suggested that modest alcohol use is associated with beneficial effects on the liver.<sup>3, 4</sup>

The dose-response effect of modest alcohol use on the liver has not been well studied among persons of Hispanic/Latino background.

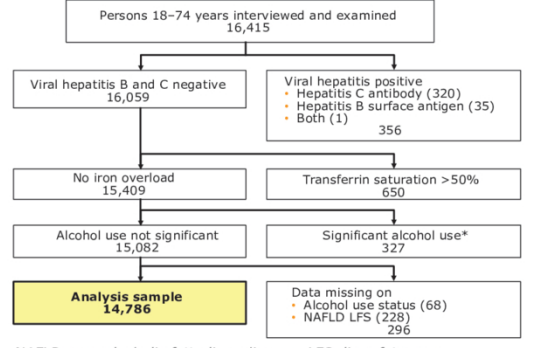
## Methods

### Source Population:

#### Hispanic Community Health Study/Study of Latinos (HCHS/SOL)

- Population-based cohort of 16,415 Hispanic/Latino adults age 18-74 years living in US.
- Includes persons of Mexican, Puerto Rican, Dominican, Cuban, Central American, and South American, or more than one/other background.
- Recruited by field centers in Bronx, Chicago, Miami, and San Diego.
- Longitudinal study with baseline data collected during 2008-2011.
- Participants underwent interviews, physical examinations, and laboratory tests.

## Analysis Sample



NAFLD, non-alcoholic fatty liver disease; LFS, liver fat score  
\*Significant alcohol use (drinks/week): >14 for women or >21 for men.

## NAFLD definition:

### High NAFLD Liver Fat Score (LFS):<sup>5</sup>

- LFS = -2.89 + 1.18\*metabolic syndrome (yes=1, no=0) + 0.45\*type 2 diabetes (yes=2, no=0) + 0.15\*fasting serum insulin (mU/L) + 0.04\*AST - 0.94\*AST/ALT
- Cut-point:  $\geq 1.257$ , as previously published.<sup>5</sup>

## Liver fibrosis definition:

### High NAFLD Fibrosis Score (NFS):<sup>6</sup>

- NFS = -1.675 + 0.037\*age (years) + 0.094\*BMI (kg/m<sup>2</sup>) + 1.13\*prediabetes/diabetes (yes=1, no=0) + 0.99\*(AST [IU/L]/ALT [IU/L]) - 0.013\*platelet count (10<sup>9</sup>/L) - 0.66\*albumin (g/dL)
- Cut-point: >0.676, as previously published.<sup>6</sup>

## Alcohol Use:

- Self-reported in drinks/week
- Categorized as
  - Never
  - Former
  - Occasional (<1)
  - Low-moderate (1-14 for women or 1-21 for men)
- Participants with heavy use (>14 for women or >21 for men) were excluded from this analysis of NAFLD.

## Statistical Analysis:

- Analyses incorporated sample weights and design effects of the study.
- Means (standard deviation [SD]) or percentages of participant characteristics were compared by alcohol use category using ANOVA or chi-square ( $\chi^2$ ) tests.
- Odds ratios (OR) for NAFLD by alcohol use category were estimated using complex survey binary and multinomial logistic regression to adjust for factors associated with both alcohol use and NAFLD.
- Factors adjusted for were age, sex, Hispanic/Latino heritage group, attained education, BMI, and physical activity.

## Results

Figure 1: Alcohol Use Weighted Prevalence (%)

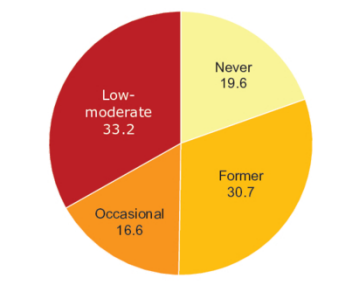


Figure 2: NAFLD and Liver Fibrosis Weighted Prevalence (%)

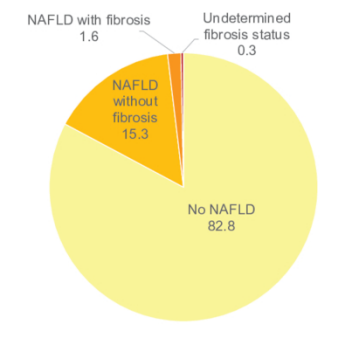


Table 1. Characteristics by Alcohol Use Category

Characteristic [Mean (SD) or percentage]	Never	Former	Occasional	Low-moderate
Age (years)	44.7 (16.3)	42.8 (15.0)	40.7 (14.4)	38.0 (13.9)
Physical activity (min/day)	92.1 (158.5)	127.9 (183.8)	128.2 (184.0)	164.0 (204.7)
Sex (%)				
Men	25.5	40.5	39.1	64.2
Women	74.5	59.5	60.9	35.8
Hispanic/Latino heritage (%)*				
Dominican	5.6	11.9	10.7	10.6
Central American	11.6	7.0	6.8	6.4
Cuban	37.2	12.9	19.2	18.0
Mexican	26.3	41.2	37.6	40.7
Puerto Rican	10.9	18.6	14.6	15.4
South American	5.4	5.0	6.3	4.6
Education attained (%)				
< high school	33.7	36.4	29.2	28.7
High school	29.6	28.9	26.0	27.8
> high school	36.6	34.7	44.8	43.5
BMI (%)				
< 25	24.5	19.8	21.2	24.6
25 - < 30	36.2	36.2	37.3	39.0
30 - < 35	24.0	25.6	25.4	23.6
35 - < 40	10.4	10.9	9.8	8.0
$\geq 40$	5.0	7.5	6.3	4.9

\*Percentages do not add to 100% because persons of more than one heritage group are not shown.

Table 2. NAFLD Prevalence and Age-adjusted Odds Ratios by Alcohol Use Category

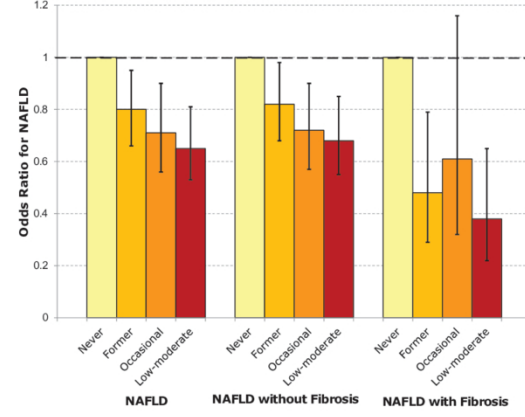
NAFLD Alcohol use	Number with NAFLD	Prevalence (%)	Age-adjusted		
			OR	95% CI	p-value
<b>NAFLD</b>					
Never	646	19.9	1.0		
Former	1,068	18.8	0.97	0.83-1.13	0.70
Occasional	447	15.7 <sup>1,2</sup>	0.81	0.66-0.99	<b>0.038</b>
Low-moderate	679	14.7 <sup>1,2</sup>	0.79	0.66-0.94	<b>0.008</b>
<b>NAFLD without fibrosis</b>					
Never	565	17.0	1.0		
Former	933	16.7	0.99	0.84-1.15	0.85
Occasional	397	13.8 <sup>1,2</sup>	0.81	0.67-0.99	<b>0.041</b>
Low-moderate	616	13.7 <sup>1,2</sup>	0.82	0.68-0.99	<b>0.036</b>
<b>NAFLD with fibrosis</b>					
Never	71	2.6	1.0		
Former	111	1.7	0.79	0.51-1.20	0.26
Occasional	44	1.6	0.85	0.47-1.55	0.60
Low-moderate	57	0.9 <sup>1,2</sup>	0.57	0.35-0.93	<b>0.024</b>

Significantly different,  $p < 0.05$ , from <sup>1</sup>never, <sup>2</sup>former, and <sup>3</sup>occasional alcohol use.

## Summary:

- The prevalence of NAFLD was lower among occasional and low-moderate compared to never and former drinkers ( $p < 0.001$ ).
- After adjustment for age:
  - The odds of NAFLD were 20% lower among occasional and low-moderate alcohol users compared to never drinkers.
  - The strongest association was between NAFLD with fibrosis and low-moderate alcohol use with an over 40% lower odds compared to never drinkers.

Figure 3: Multivariable-adjusted NAFLD Odds Ratios (95% CI) by Alcohol Use Category



## Summary:

### After multivariable adjustment:

- The NAFLD odds were further decreased for occasional and low-moderate alcohol users, as well as for former drinkers.
- NAFLD with fibrosis was more strongly associated with low-moderate and former drinking than was NAFLD without fibrosis.

## Additional Analyses:

- Alcohol type:** When consumption of wine, beer, and liquor was examined individually, ORs for NAFLD among low-moderate compared to never drinkers ranged from 0.53 to 0.61 ( $p \leq 0.001$  for each).
- Adjustment for insulin resistance:** The lower odds of NAFLD among former, occasional, and low-moderate alcohol users was no longer observed when multivariable models were further adjusted by homeostasis model assessment of insulin resistance deciles ( $p \geq 0.34$  for each).

## Overall Summary

- The prevalence of never, former, occasional, and low-moderate alcohol use was 20%, 31%, 16%, and 33%, respectively.
- The prevalence of NAFLD and NAFLD with fibrosis was 17.2% and 1.6%, respectively.
- The prevalence of NAFLD was lower among occasional and low-moderate compared to never and former drinkers.
- Compared to never drinkers, age-adjusted odds of NAFLD were 20% lower among occasional and low-moderate alcohol users.
- Multivariable-adjusted NAFLD odds were further decreased by 30% for occasional and low-moderate alcohol users and by 20% for former drinkers.
- Low-moderate and former drinking were more strongly associated with NAFLD with fibrosis than NAFLD without fibrosis.

## Conclusion

Among Hispanic/Latino adults in the HCHS/SOL, former and low-moderate alcohol use was associated with a lower prevalence of NAFLD and liver fibrosis; occasional drinking was associated with a lower prevalence of NAFLD.

These cross-sectional associations may be mediated through effects of varying degrees of insulin resistance.

Examination of the longitudinal relationship between alcohol use and liver health among HCHS/SOL participants is underway during the second study visit (2014-2017).

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Investigator's Study Website:

[www.csc.ccc.unc.edu/hchs](http://www.csc.ccc.unc.edu/hchs)

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