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Acculturation and NAFLD Risk among Hispanics of Mexican-Origin: findings from the National Health and Nutrition Examination Survey

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Dear Editor

We read with interest recent publications in *Clinical Gastroenterology and Hepatology* highlighting the high burden of nonalcoholic fatty liver disease (NAFLD) among Hispanics in the United States (1), as well as the variability in prevalence among Hispanics according to their heritage (2). NAFLD occurs as the consequence of a complex interplay of genetic, environmental, and lifestyle factors. Greater exposure to known risk factors (e.g., visceral adiposity, diabetes, unfavorable PNPLA3 gene variant) compared to other ethnic sub-groups may explain the higher prevalence of NAFLD in Hispanics (3). Rarely considered in the context of NAFLD, however, are socioeconomic and cultural factors that may influence risk of developing NAFLD.

“Acculturation” is a sociological process in which members of one cultural group adopt the beliefs and behaviors of another group. As migrants to the U.S. become more “acculturated”, exposure to new lifestyles, diets, beliefs, and environment may change their risk of developing chronic disease. Among Mexican-Americans, acculturation is associated with increased risk of obesity and possibly diabetes (4, 5) and may confer increased risk for NAFLD; however this has not been investigated. Understanding this potential cultural effect may provide further insight into the etiology of NAFLD and help inform the design of culturally appropriate interventions for prevention of NAFLD.

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Therefore, we used cross-sectional data from the National Health and Nutrition Examination Survey (NHANES) to evaluate the association between acculturation and NAFLD risk among individuals of Mexican heritage in the U.S. (hereafter, “Mexican-Americans”). We used two separate analytic datasets: (1) data from NHANES III (1988–1994); and (2) pooled data from three continuous cycles of NHANES (years 1999–2000, 2001–2002, and 2003–2004; “NHANES 1999–2004”).

For both datasets, we included adults over 20 years of age who self-reported being of Mexican heritage and born in the U.S. or Mexico, and who did not have evidence of seropositivity for hepatitis B or C, significant alcohol consumption (>3 drinks/day for men; >2 drinks/day for women), iron overload (serum transferrin saturation>50%), type 1 diabetes mellitus, or were pregnant at the time of the survey.

Ultrasound data were available in the NHANES III dataset only; aminotransferase data were available in both NHANES III and NHANES 1999–2004. Therefore, two NAFLD definitions were used in NHANES III (one based on ultrasound and the second, on elevated aminotransferases) and one NAFLD definition was used in NHANES 1999–2004 (elevated aminotransferases). As in previously published NHANES-based analyses of NAFLD, ultrasounds showing moderate or severe hepatic steatosis were classified as NAFLD and ultrasounds showing no or mild hepatic steatosis were classified as non-NAFLD (6). Consistent with previously published population-based analyses of NAFLD, aminotransferase thresholds used to identify NAFLD were: AST > 37 or ALT > 40 U/L in males or AST or ALT > 31 U/L in females (2).

We used four well-accepted surrogates of acculturation status: place of birth (U.S. vs. Mexico), language preference measured by the 5-Item Short Acculturation Scale, generational status, and duration of residence in the U.S.(7) NHANES III included birthplace and language preference data while NHANES 1999–2004 had data to derive all four surrogates. We calculated adjusted odds ratios (OR) and 95% confidence intervals (CI) using multivariate logistic regression.

A total of 3,618 participants from NHANES III and 2,438 participants from NHANES 1999–2004 met our inclusion and exclusion criteria and were included in the analysis. Compared to Mexican-born individuals, US-born individuals were more likely to have completed higher education, had higher income and greater access to health insurance and medical care, but were also more likely to be obese and have hypertension. In the NHANES III dataset, US-born individuals were also more likely to have hypercholesterolemia and diabetes. Similar profiles were seen when we examined other surrogates of acculturation status.

According to ultrasound data, NAFLD prevalence in NHANES III was 28.2%. Using elevated aminotransferases, NAFLD prevalence was 18.5% in NHANES III and 24.6% in NHANES 1999–2004. We found no differences in the prevalence of NAFLD between Mexican-born and US-born Mexican-Americans (Table). Likewise, there were no associations between language preference, generation status or duration of residence in the U.S. and risk of NAFLD.

In summary, we found that several known NAFLD risk factors – obesity, high waist circumference, hypertension, hypercholesterolemia – were more prevalent among Mexican-Americans with greater acculturation compared to less acculturated Mexican-Americans. However, despite the greater prevalence of NAFLD risk factors, we found no significant association between acculturation and risk of NAFLD.

Previous work has similarly found greater prevalence of obesity among U.S.-born Hispanics as compared with foreign-born Hispanics (4). However, findings have been mixed with regard to diabetes where a higher prevalence of obesity but a lower prevalence of diabetes among highly acculturated individuals has been seen (5). Our discordant findings of greater prevalence of obesity among U.S.-born but lack of an association between high acculturation and NAFLD may be a manifestation of the obesity-diabetes paradox observed in prior studies.

Hispanics of Mexican-origin are the largest U.S. based Hispanic subgroup (8) and the group with the highest prevalence rates of NAFLD in the country (2). Our findings suggest that risk factors that predispose Mexican-Americans to NAFLD surpass acculturation as measured in NHANES. However, future studies should consider the possible effect of other socioeconomic and cultural factors that may contribute to NAFLD development and outcome.

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Table 1

Associations between measures of acculturation and risk of NAFLD

	NHANES III (1988–1994)		NHANES 1999–2004	
	NAFLD, Weighted %	AOR* (95% CI)	NAFLD, Weighted %	AOR* (95% CI)
NAFLD – ultrasound				
Born in the US				
Yes	30.1	1.00 (Ref)	-	-
No	26.7	0.96 (0.72–1.27)	-	-
NAFLD – elevated aminotransferases				
Born in the US				
Yes	17.1	1.00 (Ref)	24.3	1.00 (Ref)
No	19.6	1.04 (0.77–1.40)	24.8	0.99 (0.79–1.23)
Acculturation Score				
High Acculturation (11)	-	-	23.8	1.00 (Ref)
Low Acculturation (10)	-	-	25.1	1.02 (0.76–1.37)
Generational Status				
1	-	-	24.9	1.04 (0.80–1.36)
2	-	-	24.9	1.13 (0.80–1.61)
3	-	-	23.4	1.00 (Ref)
Number of years residing in U.S.				
Born in U.S.	-	-	24.3	1.00 (Ref)
<10 years	-	-	22.1	0.86 (0.63–1.17)
10–<=20 years	-	-	29.5	1.04 (0.78–1.39)
>20 years	-	-	23.4	1.05 (0.74–1.48)

Models adjusted for age group (20–39y, 40–59y, 60y), sex, BMI group (<25 kg/m², 25–30 kg/m², >30 kg/m²), income, education, insurance, access to care, waist circumference, hypertension, total cholesterol, HDL, and diabetes