

THE EFFECT OF PREVALENT CARDIOVASCULAR CONDITIONS ON THE ASSOCIATION BETWEEN ALCOHOL CONSUMPTION AND MORTALITY AMONG OLDER MEXICAN AMERICAN MEN

Purpose: To examine the association between alcohol consumption and mortality among older Mexican American men, with and without pre-existing cardiovascular conditions.

Methods: We conducted survival analysis among 908 men aged 65–80 years from the Hispanic Established Population for the Epidemiological Study of the Elderly (H-EPESE), a longitudinal population-based study of older Mexican Americans who reside in the southwestern United States. Men were categorized into four alcohol-consumption groups: lifetime abstainers, former drinkers, low risk drinkers (≤ 30 drinks/month and ≤ 3 drinks/occasion) and at-risk drinkers (> 30 drinks/month or > 3 drinks/occasion) and stratified into two groups: those with and those without pre-existing cardiovascular conditions. Mortality was ascertained from 1993–1994 to 2007.

Results: Among participants without pre-existing cardiovascular conditions, former, low risk, and at-risk drinkers had a lower risk for all-cause mortality compared to lifetime abstainers [HR: .70, 95% CI (.50–.99), .64 (.42–.97) and .60 (.40–.92), respectively]. There was no statistically significant association between mortality and any of the alcohol consumption groups among those with cardiovascular conditions.

Conclusions: Among older Mexican-American men without cardiovascular conditions, former and current drinkers had lower mortality compared to abstainers. No such associations were observed between alcohol use and mortality among those with cardiovascular conditions. (*Ethn Dis.* 2013;23[2]:168–174)

Key Words: Alcohol, Cardiovascular Disease, Older Mexican Americans, Mortality

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INTRODUCTION

Observational studies have shown an association between moderate alcohol intake and lower mortality, particularly among older adults.^{1–5} The beneficial effect of moderate alcohol consumption on mortality risk is thought primarily due to the observed benefit of moderate alcohol use for those with the highest risk for cardiovascular disease.^{1,4–8} For example, the relationship between alcohol intake and mortality among participants in the Cancer Prevention Study II, aged 60 to 79 years with high cardiovascular risk was L-shaped with abstainers having the highest risk for mortality, and was a U-shaped relationship among those with low cardiovascular risk with abstainers and heavy drinkers at higher risk.¹

While the beneficial effect of moderate alcohol intake is clear among those with higher cardiovascular risk, this effect is less clear among those who have already developed coronary artery disease.^{9–11} For example, compared to occasional drinking, a study of middle aged men with diagnosed coronary heart disease who drank moderately found no significant benefit or harmful effect on coronary heart disease, cardiovascular disease or all cause mortality.¹⁰ Similarly, a study of persons aged 45–70 years with coronary artery disease showed non-significant mortality benefits from moderate drinking.⁹ In contrast, a study of 5477 participants from Western Europe with heart failure and/or evidence of left ventricular dysfunction complicating a myocardial

infarction found a strong positive relationship between moderate alcohol consumption and survival.¹² Previous studies have shown that moderate alcohol drinking is associated with improved morbidity¹³ and mortality among persons with diabetes¹⁴ a disease considered equivalent to coronary heart disease.^{15–17}

Older Mexican Americans are a rapidly growing segment of the US population.^{18,19} Previous studies have shown that, when compared to other older people in the general population, a higher percentage of Mexican American men aged ≥ 65 years exceed the recommended alcohol intake while more than 80% of older Mexican-American women are abstainers.^{19,20} The effect of alcohol consumption on mortality outcomes in older Mexican Americans and the impact of pre-existing cardiovascular conditions have not been well investigated. This issue is of high importance for older Mexican Americans, a group known for its high prevalence of diabetes,²¹ a condition considered an equivalent to cardiovascular diseases.^{16,17,22} In this study, we conducted secondary analyses of data from the Hispanic Established Population for the Epidemiological Study of the Elderly (H-EPESE) to explore the association between alcohol consumption and all-cause mortality focusing on the role of pre-existing myocardial infarction, stroke, and diabetes in a sample of older Mexican American men aged 65–80 years.

METHODS

Survey

Data used are from the Hispanic Established Population for the Epidemiological Study of the Elderly (H-EPESE).

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We conducted secondary analyses of data from the Hispanic Established Population for the Epidemiological Study of the Elderly (H-EPESE) to explore the association between alcohol consumption and all-cause mortality focusing on the role of pre-existing myocardial infarction, stroke, and diabetes in a sample of older Mexican American men aged 65–80 years.

The H-EPESE is a longitudinal study of 3050 Mexican Americans aged ≥ 65 , residing in five Southwestern states. The primary purpose of the study is to provide estimates of the prevalence of important physical and mental health conditions and functional impairments in older Mexican Americans. Participants were selected from five southwestern states (Texas, California, Arizona, Colorado, and New Mexico) using area probability sampling procedures. The sampling procedure assured a sample that is generalizable to approximately 500,000 older Mexican Americans living in the Southwest and modeled after the previous EPESE studies in East Boston, New Haven, rural Iowa and North Carolina.^{21,23} Six waves of data were collected in 1993–94, 1995–96, 1998–99, 2000–2001, 2004–2005, and in 2007. Information from the first 5 waves was used in this study. In-home interviews were conducted in Spanish or English depending on the respondent's preference. The

sample and characteristics of the baseline cohort have been described elsewhere.^{21,23}

Sample

The baseline cohort (1993–1994) included 1075 Mexican American men aged 65–80 years. We did not include women in the analysis as only 99 of 1740 (5.7%) women aged ≥ 65 reported consuming any alcohol. One hundred sixty-seven participants were excluded from analysis because they had missing values on the questions for alcohol consumption ($n=24$), covariates ($n=128$) or both ($n=14$). Eighty-seven out of the 167 participants excluded were interviewed via proxy. Participants excluded were significantly more likely to be obese and to have reported history of stroke than those included in the analysis. The analytic sample consisted of 908 participants interviewed in person.

Measurements

Alcohol Consumption

Alcohol consumption was assessed at baseline using a sequence of questions. If they answered yes to the first question, they were asked the subsequent questions until they answered no. Participants were asked: 1) if they have ever drunk any type of alcohol (beer, wine, liquor) in their entire life (not including communion wine); 2) if they have had any beer, wine, or liquor during the past year; 3) if they have had any beer, wine, or liquor in the past month; 4) how often they drank in the month prior to the interview; and 5) how many drinks on average they had per occasion. The last two questions were used to calculate the number of drinks consumed in the month prior to the interview.

Respondents were categorized into four groups using the National Institute of Alcohol Abuse and Alcoholism (NIAAA) guidelines on low risk drinking (www.rethinkingdrinking.niaaa.nih.gov):

1. Life time abstainers: those who reported not drinking alcohol in their entire life (Not including communion wine).
2. Former drinkers: those who stated that they have drunk alcohol during their entire life, but reported not drinking any beer, wine, or liquor during the past month.
3. Low risk drinkers: those who drank ≤ 30 drinks during the month prior to the interview and ≤ 3 drinks per occasion.
4. At-risk drinkers: those who drank > 30 drinks during the month prior to the interview or > 3 drinks per occasion.

To explore heavy drinking in this sample, those who reported drinking alcohol in the month prior to the interview were categorized based on the number of drinks consumed into the following groups: 1–30, 31–60, 61–90, 91–120, and ≥ 121 drinks/month.

Pre-existing Cardiovascular Conditions

History of heart attack, stroke and diabetes were assessed by asking respondents if they had ever been told by a health care provider that they had any of these conditions. Participants were stratified into two groups: those with and those without any of these cardiovascular conditions; considering diabetes an equivalent to cardiovascular disease.

Hypertension was not included in this stratification process because, in this age group, hypertension might not carry the same risk of mortality as the other conditions included²⁴ and is not a cardiovascular heart disease equivalent.²⁵ However, an additional analysis including hypertension as a pre-existing cardiovascular condition had similar results as the analysis including hypertension.

Covariates

Baseline sociodemographic variables potentially related to mortality included age (in years), marital status (not married, married), country of birth

(Mexico or the United States), and number of formal years of education. Other relevant covariates included: smoking behavior (current smokers, previous smokers and non-smokers); hypertension, either a) being told by a physician that the participant had hypertension and reporting currently taking any antihypertensive medication, or b) having an average measured systolic BP ≥ 140 or an average measured diastolic BP ≥ 90 mm Hg; body mass index (BMI) (measured weight in kilograms divided by height in meters squared and divided into non-obese (BMI < 30) and obese (BMI ≥ 30);²⁶ and self-rated global health status (excellent/good or fair/poor).

All-cause Mortality

Deaths through December 31, 2007, were ascertained through reports from relatives and confirmed by a mortality search of the National Death Index and the Social Security Administration's Death Master File. A total of 403 (44%) study participants died over the follow-up period. Participants who survived were censored at their last interview or at December 31, 2007, whichever time point was later.

Statistical Analysis

Analysis of variance and Chi square analyses were used to test the association of alcohol consumption categories with baseline characteristics. Proportions of current drinkers who drank 1–30, 31–60, 61–90, 91–120 and ≥ 121 drinks during the month prior to the interview are reported. The survival curves over an average of 13 years follow-up for the whole sample by alcohol consumption categories were estimated by the Kaplan-Meier method and tested by the log-rank test. Thirteen-year survival rates and 95% confidence intervals are reported. Two separate Cox proportional hazards models were used to estimate the hazard ratios of death for participants with and without pre-existing cardiovascular conditions. In each of the two

models, proportional hazard assumptions and a linear functional form of the continuous variables (age, education) were examined by plotting a standardized score process or cumulative Martingale residuals against follow-up time in years and tested by the Kolmogorov-type supremum test.²⁷ No violation of proportionality was found and the linear function of age and education were satisfactory. Adjusted hazard ratios for alcohol consumption categories were calculated with lifetime abstainers as the reference group. All models were adjusted for age, education, country of birth, smoking, obesity and self-rated health. Hypertension was not included in the model as it is believed to be in the causal pathway between alcohol consumption and mortality.^{2,28,29} Unadjusted death rates and 95% confidence intervals were estimated from the failure rate at thirteen-year follow up from Kaplan-Meier curves. All analyses were performed using SAS statistical software, version 9.2.0 (SAS Institute, Inc).

RESULTS

Sample Characteristics

The mean age of the sample at baseline (1993–1994) was 71.2 years with a standard deviation (SD) of 4.1 years. Seventy-seven percent were married, and 59% were born in the United States. Almost 30% of the sample had more than 7 years of education. There were 38.8% never smokers, 41.3% previous smokers and 19.9% current smokers. Twenty-four percent of the sample was obese (BMI ≥ 30 Kg/m²), 24% reported having diabetes, 10.2% reported ever having a heart attack and 5.3% reported ever having a stroke. Forty-seven percent of the sample reported excellent/good general health (Table 1).

Alcohol Consumption Patterns

Twenty-six percent of the sample were lifetime abstainers, 43% were

former drinkers, 16% were low risk drinkers, and 15% were at-risk drinkers. Among at-risk drinkers ($n=134$), 40% exceeded the recommended limit for drinks per occasion (≤ 3 drinks per occasion), 24% exceeded the limit for drinks per month only (≤ 30 drinks per month), and 36% exceeded both. For a better understanding of the extent of at-risk drinking in this sample, percentages of participants who consumed 1–30, 31–60, 61–90, 91–120, and ≥ 121 drinks/month are reported. Seventy-one percent of current drinkers drank between 1 and 30 drinks per month, 15% drank 31–60 drinks/month, 3.9% drank 61–90 drinks/month, 3.6% drank 91–120 drinks/month, and 6.4% drank > 121 drinks/month.

There were no statistically significant differences between the alcohol consumption groups by age, marital status or country of birth. However, there were statistically significant differences by years of education, smoking behavior, self-reported diabetes, stroke, self-rated health, and hypertension (Table 1).

Figure 1 shows Kaplan-Meier survival curves illustrating the unadjusted

This study provides evidence that, compared to lifelong abstinence, alcohol consumption even at levels exceeding the recommended intake for older adults is associated with a lower risk of all-cause mortality among older Mexican American men aged 65–80 without pre-existing cardiovascular conditions.

Table 1. Baseline descriptive characteristics of Mexican American men aged 65–80 years by alcohol consumption category, N=908^d

	Total N=908	Life time abstainers n=240 (26.4%)	Former drinkers n=391 (43.1%)	Light to moderate drinkers n=143 (15.8%)	Heavy drinkers n=134 (14.8%)
Age, mean \pm SD	71.1 \pm 4.1	71.0 \pm 4.3	71.4 \pm 4.1	71.1 \pm 3.9	70.4 \pm 3.7
Married	701/908 (77.2)	184/240 (76.7)	302/391 (77.2)	115/143 (80.4)	100/134 (74.6)
US born	535/908 (58.9)	143/240 (59.6)	219/391 (56.0)	87/143 (60.8)	86/134 (64.2)
Years of education ^b	5.3 \pm 4.1	5.2 \pm 3.7	4.8 \pm 4.0	6.2 \pm 4.5	5.7 \pm 4.2
Smoking ^a					
Never	352/908 (38.8)	201/240 (83.8)	93/391 (23.8)	32/143 (22.4)	26/134 (19.4)
Previous	375/908 (41.3)	24/240 (10.0)	221/391 (56.5)	74/143 (51.8)	56/134 (41.8)
Current	181/908 (19.9)	15/240 (6.3)	77/391 (16.7)	37/143 (25.9)	52/134 (38.8)
Obesity (BMI \geq 30 Kg/m ²)	215/908 (23.7)	49/240 (20.4)	104/391 (26.6)	31/143 (21.7)	31/134 (23.1)
Diabetes ^a	222/908 (24.5)	56/240 (23.3)	122/391 (31.2)	28/143 (19.6)	16/134 (11.9)
Heart attack	92/903 (10.2)	15/239 (6.3)	47/390 (12.1)	19/143 (13.4)	11/133 (8.3)
Stroke ^c	48/902 (5.3)	7/239 (2.9)	30/387 (7.8)	7/143 (4.9)	4/133 (3.0)
Hypertension ^a	497/865 (57.5)	153/227 (67.4)	220/375 (58.7)	65/138 (47.1)	59/125 (47.2)
Self-reported health ^a (excellent/good)	429/908 (47.3)	140/240 (58.3)	145/391 (37.1)	75/143 (52.5)	69/134 (51.5)

Data are n/N (%) or mean \pm SD.

^a $P < .001$ for the difference between the alcohol consumption categories.

^b $P < .01$ for the difference between the alcohol consumption categories.

^c $P < .05$ for the difference between the alcohol consumption categories.

^d n varies for heart attack, stroke and hypertension variables because of missing values.

association between alcohol consumption categories with survival rates for the total sample. These data suggest an association between higher alcohol consumption and better survival. The thirteen-year survival rates were 53.1% (95% CI: 44.1–61.7) for heavy drinkers, 46.7% (95% CI 37.9–54.9) for light-to-moderate drinkers, 38.9% (95% CI 33.8–43.9) for previous drinkers and 42.3% (95% CI 35.9–48.6) for lifetime abstainers (Log-Rank $P = .044$).

Table 2 presents the number of all-cause deaths, all-cause death rates and adjusted all-cause mortality hazard ratios for alcohol consumption categories among participants with and without pre-existing cardiovascular conditions including heart attack, stroke, and diabetes. Sixty-two percent of the sample did not have a history of any of these conditions, while 38% reported having at least one of them. Among participants without pre-existing cardiovascular conditions and after adjusting for age, country of birth, education, smoking, obesity and self-rated health, former drinkers, low risk drinkers and at-risk drinkers were at a significantly lower risk

of mortality when compared to lifetime abstainers. There were no significant associations between alcohol consumption categories and mortality among participants with pre-existing cardiovascular conditions

DISCUSSION

This prospective study examined the association between alcohol consumption and all-cause mortality in this sample of 908 Mexican American men

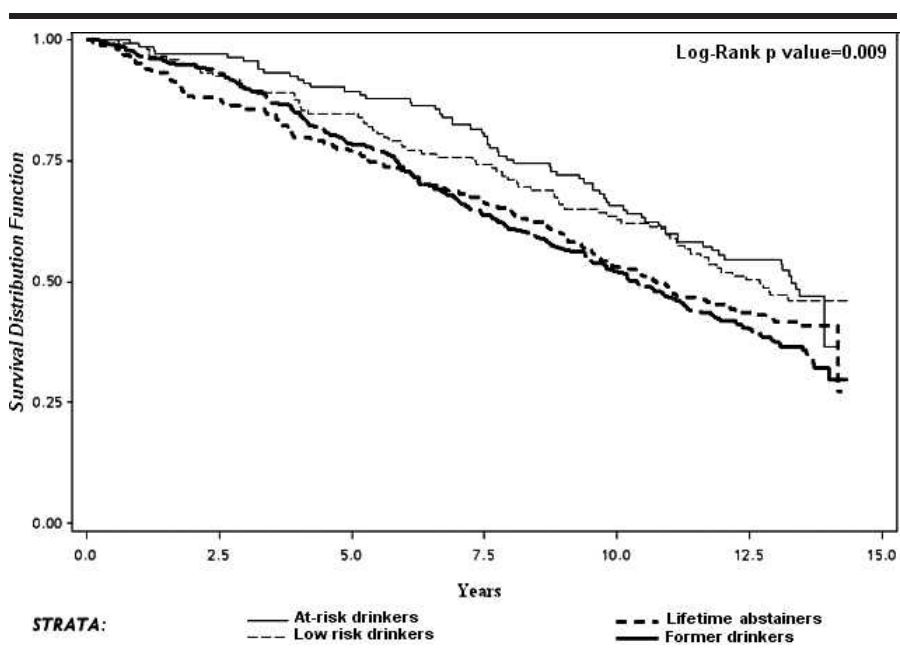


Fig 1. Survival curves for Mexican American Men Aged 65–80 by Alcohol Consumption Category at Baseline Interview

Table 2. Number of deaths and multivariate-adjusted hazard ratios by alcohol consumption categories among older Mexican American men with and without pre-existing cardiovascular conditions (N=908)^a

	Lifetime abstainers	Former drinkers	Light to moderate drinkers	Heavy drinkers
Without pre-existing cardiovascular conditions				
Total	146	217	97	104
Number of deaths	75	115	43	45
Death Rate % (95%CI) ^b	51.9 (43.9-60.5)	53.4 (46.6-60.5)	48.4 (38.5-59.4)	41.0 (31.8-51.7)
HR for mortality ^c	1.00	.70 (.50-.99)	.64 (.42-.97)	.60 (.40-.92)
With pre-existing cardiovascular conditions				
Total	94	174	46	30
Number of deaths	61	120	29	21
Death rate % (95%CI) ^b	66.5 (56.7-76.0)	70.7 (63.6-77.5)	63.9 (49.7-77.8)	64.6 (47.6-81.3)
HR for mortality (95%CI) ^c	1.00	.95 (.65-1.39)	.78 (.46-1.31)	.80 (.45-1.43)

^a Cardiovascular conditions included are self-reported heart attack, stroke and diabetes.

^b Death Rates are obtained from Kaplan Meier failure estimation at 13-year follow up.

^c Hazard ratios are adjusted for age, education, country of birth, smoking status and obesity.

aged 65–80 stratified by presence or absence of pre-existing cardiovascular conditions. Former drinkers and low risk and at-risk drinkers were at a lower risk for 13 year all-cause mortality when compared to lifetime abstainers among participants with no pre-existing cardiovascular conditions. No significant associations with mortality were found among the four alcohol consumption groups for those with pre-existing cardiovascular conditions.

Our finding of lower risk of mortality for low risk drinking in older persons without pre-existing cardiovascular conditions is consistent with previous reports.^{1,2,30,31} For example, Thun and colleagues¹ found that men aged 60 to 79 without a history of cardiovascular risk factors at baseline who drank ≤1 drink per day were at a lower risk of all cause-mortality compared to non-drinkers. We also found that participants who exceeded the limit of 1 drink per day (30 drinks per month) were at a lower risk of mortality when compared to lifetime abstainers. This is partially consistent with findings from the analysis conducted by Thun et al¹ showing a significant reduction in mortality among those who drank 2 drinks per day but no mortality benefits among those who drank >2 drinks per day. However, in our sample few participants reported

very heavy drinking, which might have limited our ability to detect the attenuation of the mortality benefits among at-risk drinkers.

There is a considerable body of literature suggesting that older adults are not at a higher risk of mortality at alcohol consumption levels exceeding the recommended limits of 1 drink per day.^{1,3,30} For example, Lang and colleagues³⁰ found that among elderly men, mortality rates for participants with alcohol intake between 1–2 drinks per day were lower than that for abstainers. Our results for participants without pre-existing cardiovascular conditions support the assertion by others that the current US recommendation of one drink per day for an older adult may be restrictive.^{30–32} However, morbidity outcomes were not tested in our study. Further investigation of other outcomes of alcohol consumption in the elderly is critical to reach an accurate definition of moderate drinking in this age group.

We found that participants with pre-existing cardiovascular conditions including diabetes had no apparent mortality benefit from any level of alcohol consumption. This contradicts much of the existing literature demonstrating benefits of alcohol consumption on total mortality outcomes in settings of coronary heart disease in younger

populations^{9–11} and may be a result of the relatively small sample size in this sub-group.

An interesting finding was the mortality benefit found among former drinkers. This group typically has higher mortality compared to other drinking groups as often illness converts drinkers to abstainers.^{9,33}

We could not assess the effects of changes in alcohol consumption level over time on mortality, as the follow-up data did not include information on alcohol consumption frequency and quantity. However, in a crude analysis using drinking status (presently drinking versus abstention) during follow-ups, we found that <25% percent of the sample changed drinking status during the follow up period. Similarly, a previous report showed that drinking patterns tend to be relatively stable among older individuals,³⁴ which might indicate that changes in drinking patterns over the follow up period might not have a significant impact on our findings.

Our study has additional limitations. First, quantifying alcohol consumption among this population of older adults with limited education may have been difficult considering the complexity of the questions asked to assess frequency and quantity of

drinking. In addition, subjects may under-report their alcohol consumption.³⁵ However, any under-reporting of alcohol consumption would strengthen the association between higher alcohol consumption and better survival. Second, we did not have information on episodic heavy drinking, limiting our assessment of the potential risk of this drinking pattern. However, as a means of identifying heavier drinkers, we included those who usually drank ≥ 3 drinks at a time in our definition of heavy drinkers. Third, our analysis included self-reported medical problems, which might not give a precise estimate of these conditions.

To our knowledge, this is the first study addressing mortality as a function of alcohol consumption among older Mexican-American men, a fast growing population in the United States. This study provides evidence that, compared to lifelong abstinence, alcohol consumption even at levels exceeding the recommended intake for older adults is associated with a lower risk of all-cause mortality among older Mexican American men aged 65–80 without pre-existing cardiovascular conditions.

Though our findings suggest that even at-risk drinking is protective of mortality in this sample of older Mexican American men without pre-existing medical conditions, we cannot advocate that such drinking is healthy for this group, as we did not examine other important health-related outcomes such as accidents, gastrointestinal problems, and social, physical and cognitive health. In addition, the different findings between those with and without pre-existing cardiovascular conditions should encourage individualized advice about the health effects of drinking especially among such a population with much comorbidity.^{11,36–38} Further studies are needed to examine the impact of varying alcohol consumption patterns on cause-specific mortality, as well as other health outcomes in older Mexican Americans.

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