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Chamomile Consumption and Mortality: A Prospective Study of Mexican Origin Older Adults

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Purpose: Approximately 20% of adults use some kind of herbal; however, little data exists from population-based study or clinical trials to support effectiveness of most herbal products. Chamomile is a commonly used herb among older adults of Mexican origin. We examined the effects of herbal chamomile consumption on mortality among older adults of Mexican origin.

Methods and Design. A sample from the Hispanic Established Populations for Epidemiologic Study of the Elderly, a population-based study of noninstitutionalized Mexican Americans aged 65 and older from five Southwestern states (Texas, California, New Mexico, Colorado, and Arizona). We included all men and women from 2000 to 2007 (n = 1,677).

Results. Chamomile was used by 14% of the sample. Cox proportional hazards regression analyses showed that chamomile was associated with a decreased risk of mortality in the total sample (hazard ratio [HR] 0.71, 95% confidence interval [CI] 0.55–0.92) and for women (HR 0.67, 95% CI 0.49–0.92) but not for men. In models adjusted for sociodemographic variables, health behaviors, and chronic conditions, chamomile remained significantly associated with reduced mortality in women (HR 0.72, 95% CI 0.53–0.98).

Implications. The use of chamomile shows protective effects against mortality in this sample of older adults of Mexican origin for women. Further research is warranted in other populations to determine if these effects are consistent.

Key Words: Hispanic, Herbs and supplements, Mortality

Herb and supplement use for health reasons has been increasing in the last 10–15 years. Recent research using the 2002 National Health Interview Survey/Complementary and Alternative Medicine supplement (NHIS-CAM) showed that 20% of the U.S. population used some type of herb or supplement in the last 12 months (Kennedy,

Wang, & Wu, 2008). Prevalence among Hispanics and Asians is 30% (Gardiner et al., 2012), and prevalence is higher among women than men (Eisenberg et al., 1998; Mackenzie, Taylor, Bloom, Hufford, & Johnson, 2003).

One of the most common forms of herb use is as a brewed beverage. Tea consumption, both black and green, has been linked to a lower risk of mortality, reduced cardiovascular events, and reduced incidence of some cancers (Cooper, Morre, & Morre, 2005; Iwai et al., 2002; Kris-Etherton & Keen, 2002; Kuriyama et al., 2006; Tsubono et al., 2001; Zaveri, 2006; Zheng et al., 1996). A report on the effects of green tea on all-cause and cause-specific mortality of adults in Japan suggested that consumption of three or more cups of green tea per day was associated with a 12% reduction in risk of death over an 11-year period (Kuriyama et al., 2006). The relationship was stronger in women and for cardiovascular-related deaths. In addition, a meta-analysis of 17 observational epidemiological studies examining the effect of tea consumption on cardiovascular diseases showed an 11% reduction in risk of myocardial infarction (Peters, Poole, & Arab, 2001).

Kuriyama and colleagues (2006) argued in their 2006 study that something that is widely consumed and is also associated with longer life expectancy could have enormous public health implications. Although black and green teas are commonly used in certain population subgroups, Hispanics, especially Mexican-origin adults, typically consume brewed chamomile (Zeilmann et al., 2003).

One study of 186 Hispanic and non-Hispanic White patients from a clinic in Albuquerque, New Mexico, showed that approximately half of patients interviewed used herbal medicines in the past year—one of the most common was chamomile (Zeilmann et al., 2003). Another study reported that 77% of patients interviewed used some form of complementary and alternative medicine, including 13% using chamomile (Rivera, Ortiz, Lawson, & Verma, 2002). A study in South Florida among Hispanics showed a high rate (75%) herbal remedy use over a 12-month period, of which chamomile was one of the most prevalent (Ortiz & Clauson, 2006).

Finally, a cross-sectional study using data from the Hispanic Established Population for the Epidemiologic Studies of the Elderly (H-EPESE) showed that herbal medication use is common among older Mexican origin adults living in the Southwest (Loera, Black, Markides, Espino, & Goodwin, 2001) and highest among women. Approximately 10% of the sample reported using an herbal medication in the last 2 weeks, the most common being chamomile. The authors examined correlates of herbal medication usage and found that persons who used herbs had higher numbers of chronic conditions and were frequent consumers of health care services. They also observed that women were twice as likely as men to use herbal remedies. This difference between Hispanic men and women in the use of herbal products may be due to traditional gender roles whereby women manage the day-to-day activities of the household including family health and may also reflect greater reliance on folk remedies (Mendelson, 2003; Pinquart & Sörensen, 2006).

Health Benefits of Chamomile

The potential health benefits of chamomile focus on its phytochemical content and have been examined in both human and animal studies (McKay & Blumberg, 2006). The major active compounds in chamomile, (terpenoids alpha-bisabolol, and azulenes) have been shown to have antioxidant, antimicrobial, antiplatelet, and anti-inflammatory characteristics (McKay & Blumberg, 2006). Other beneficial properties include chemoprevention, cholesterol lowering activities, antigenotoxic effects, and sedative effects (McKay & Blumberg, 2006). The antioxidant characteristics of chamomile are associated with reducing lipid oxidation (Guimarães et al., 2013; Rekka, Kourounakis, & Kourounakis, 1996) and may influence consequences of peroxidation such as atherosclerosis. Additionally, apigenin glucosides and alpha-bisbolol found in chamomile have shown potential in inducing apoptosis in cancer cells (Cavalieri et al., 2004; Kassi et al., 2004; Ogata-Ikeda, Seo, Kawanai, Hashimoto, & Oyama, 2011; Srivastava & Gupta, 2007). Few human studies (especially prospective studies and clinical trials) exist on long-term effects of chamomile on health outcomes.

Chamomile is often used in Mexico for gastrointestinal tract ailments, such as colitis, gastritis, spasms, and diarrhea (Rodriguez-Fragoso, Reyes-Esparza, Burchiel, Herrera-Ruiz, & Torres, 2008). Preliminary evidence from clinical case series showed that chamomile is useful in treating mucositis and dyspepsia. Melzer, Rosch, Reichling, Brignoli, and Saller (2004) demonstrated that chamomile potentially slows peristaltic movement, potentially decreasing dyspepsia. A chamomile rinse reduced the likelihood of having mucositis secondary to radiation and chemotherapy (McKay & Blumberg, 2006).

Although the beneficial effects of chamomile have the potential to reduce mortality from all causes and from cardiovascular disease and cancer in particular, it is unclear if the positive effects of chamomile translate to decreased mortality in long-term users. The current study explores the connection between consumption of chamomile tea and 7-year all-cause mortality in a sample of older Mexican American adults residing in the Southwestern United States. Given the results from other cohort studies on the health protective effects of consumption of black and green

tea (Kris-Etherton & Keen, 2002; Kuriyama et al., 2006; Peters et al., 2001; Tsubono et al., 2001; Zheng et al., 1996) as well as the broad biological effects of chamomile and potential for cardiovascular and cancer risk reduction, we hypothesized that consumption of chamomile tea would be associated with reduced all-cause mortality and possibly cardiovascular and cancer mortality in Mexican origin older adults. We also hypothesized that, due to gender differences in the rate of chamomile consumption, the effect of chamomile on mortality would be different for men and women.

Materials and Methods

Sample

The sample includes participants in the H-EPESE. The H-EPESE is a population-based study of 3,050 noninstitutionalized Mexican Americans aged 65 and older at baseline (1993–1994) from five Southwestern states (Texas, California, New Mexico, Colorado, and Arizona). Seven waves of data have been collected (1993–1994, n = 3,050; 1995–1996, n = 2,438; 1998–1999, n = 1,981; 2000–2001, n = 1,682; 2004–2005, n = 1,167; 2007, n = 921; 2010–2011, n = 659). Details regarding the methods have been described elsewhere (Markides, Rudkin, Angel, & Espino, 1997; Markides et al., 1999). Our sample starts with Wave 4 (2000–2001, n = 1,677) because the question about herb use was reliably asked in this wave. Mortality data exist through 2007, representing approximately 7-year mortality. All research protocols and informed consents were approved by the Institutional Review Board of the University of Texas Medical Branch.

Dependent Variable

Mortality was verified from the National Death index and Social Security data. The key dependent variable is 7-year all-cause and cause specific mortality. Cause specific mortality was determined by ICD-10 codes from the death records and included cardiovascular disease (ICD-10 codes I10–I98), cancer (ICD-10 codes C00–C97) and chronic heart disease (ICD-10 codes I20–I25). Date of death was also determined from death records.

Independent Variable

The key independent variable is consumption of chamomile. This was determined by a follow-up to a question in Wave 4 assessing the use of a home or herbal remedy for health purposes in the last 12 months. The question, "what is the name of (this herb/one of the herbs) or home remedy?" was coded to include over 50 types of herbs. The interviewer was instructed to record the name of up to four herbs in English or Spanish. Chamomile use was code as "yes" if any of the herbs were listed as "chamomile" or "manzanilla."

Additional covariates included age (continuous), gender (female vs male), marital status, education (<11 years, 11–12 years, and >12 years), nativity (U.S. born vs foreign-born), and degree of financial strain (assessed by asking the respondent the amount of problems they had in meeting monthly bills, ranging from none to a great deal). Health history was also ascertained by asking the respondents if they had been diagnosed with heart attack, diabetes, arthritis, or hypertension since the last interview. Analyses also adjusted for other health history items related to mortality including health behaviors, disability, and depression. Health behaviors included smoking status (current or not current), alcohol consumption (current drinker or not current), and body mass index (calculated as weight in kilograms divided by height in meters squared) divided into categories of under-weight (BMI < 18.5), over-weight (25 ≤ BMI < 30), and obese (BMI ≥ 30) with normal-weight being the referent (18.5 ≤ BMI < 25). Disability included a count of activity of daily living limitations (ADLs—e.g., needing help walking, transferring from a bed to a chair, feeding oneself). Depressive symptoms were measured through the Center for Epidemiologic Studies Depression Scale (CESD) (Radloff, 1977). A CESD score of 16 or higher was used to denote the presence of depressive symptoms and coded yes or no.

Statistical Analyses

Initial demographic statistics were compiled for the total sample and for women and men separately. Nonparametric Kaplan–Meier plots were constructed for the entire sample and for men and women separately. Cox proportional hazards regression models were then used to calculate hazard ratios (HRs) and 95% confidence intervals (CIs) for all-cause mortality and cause specific mortality according to chamomile tea consumption while adjusting for confounders. The final survival status of each subject in the cohort was ascertained at the end of collection of Wave 6 data in December, 2007 (approximately 7 years after Wave 4). This date was used to censor survival times. This represented 7,824 person years and 644 deaths. In addition, we performed competing risk analyses for each of the cause specific models to remove bias that censoring other deaths might introduce, as well as models accounting for missing CESD and strain. The proportional hazard assumption was tested through examination of scaled Schoenfeld residuals and showed no significant deviation from a zero slope.

Cox proportional hazard analyses for all-cause mortality, cardiovascular disease, cancer, and chronic heart disease were run for the total sample as well as for men and women separately. In each case, the first model adjusted only for the use of chamomile. The second model included chamomile as well as age, gender (total sample only), marital status, education, financial strain, and nativity. The third model included all covariates from Model 2 and added hypertension, heart attack, diabetes, and arthritis. The forth model included the covariates from Model 3 and added ADL limitations, depressive symptoms, BMI, smoking status, and alcohol consumption. All analyses were conducted with Stata 12 MP (StataCorp. 2011. Stata Statistical Software: Release 12, College Station, TX).

Results

Baseline characteristics of the total sample and by gender at baseline (Wave 4 for this study) are shown in Table 1. The sample had a mean age of 79.53 years (standard deviation = 5.69) and was mostly female (61.54%). Of the entire sample, 13.95% consumed chamomile. Compared to women, a greater percent of men were married, were overweight, smoked, and consumed alcohol. Compared to men, a greater percent of women were widowed, had hypertension, had arthritis, had depressive symptoms, were obese, and used chamomile (Table 1).

Figure 1 displays the Kaplan–Meier survival plots by chamomile consumption. The upper panel represents the entire sample, the middle panel women and the bottom panel men. In the entire sample, participants in the chamomile group demonstrate increased survival (p = .008). This pattern is repeated in the plot for women (p = .011). The plot for men indicates no statistically significant difference in survival time between participants consuming chamomile and those who did not (p = .824).

Table 2 presents the results of the Cox proportional hazard models for all-cause mortality as a function of chamomile tea consumption. In the unadjusted models, chamomile was associated with a 29% reduction in risk of mortality (HR 0.71, 95% CI 0.55–0.92) for the entire sample, a 33% reduction in risk of mortality for women (HR 0.67, 95% CI 0.49–0.92) and a nonsignificant reduction for men. In the full model, chamomile use was associated with a 28% reduction in risk for women (HR 0.72, 95% CI 0.53–0.98) after adjustment for age, marital status, education, financial strain, nativity, hypertension, heart attack, diabetes, arthritis, ADL limitations, depressive symptoms, BMI, smoking status, and alcohol consumption. The results of the full model for the total sample and for men were not significant.

Also shown in Table 2 are significant factors associated with increased hazard of mortality from the fully adjusted model. In the total sample, female gender was associated with a 45% reduction in hazard of death from all causes. A one point increase in ADL limitations was associated with a 19% increase in hazard of death for the whole sample and women and a 21% increase in hazard of death for men. While nativity had no effect on men, U.S. born women had 27% increased hazard of death. Women who were underweight also had a more than twofold increase in hazard. Depressive symptoms (CESD ≥ 16) in men were associated with a 37% increase in hazard while obesity

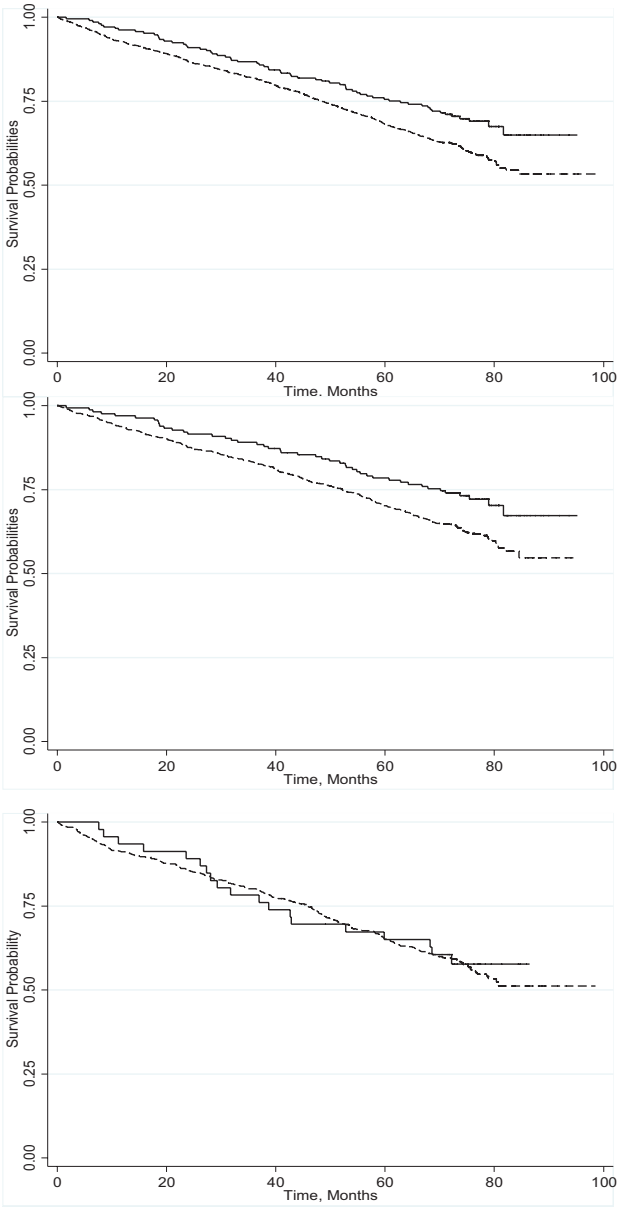

Figure 1. Plots of Kaplan–Meyer survival estimates for all, women, and men by chamomile user status in the H-EPESE, 2000–2007. The top panel represents the entire sample (p = .008), the middle panel represents women (p = .011) and the bottom panel represents men (p = .824). In each panel, the dotted line represents no chamomile use, and the solid line represents chamomile use.

Table 1. Characteristics of the H-EPESE Total Sample and Stratified by Gender at Wave 4 (2000–2001) (n = 1,677)

	Total	Women	Men
	Mean (*SD*) or %	Mean (*SD*) or %	Mean (*SD*) or %
N	1,677	1,032	645
Age	79.53 (5.69)	79.75 (5.86)	79.17 (5.40)
Female	61.54		
Married	45.62	30.14	70.39
Widowed	43.53	57.27	21.55
School: <11 years	86.38	87.32	84.88
School: 11–12 years	10.41	10.13	10.87
School: >12 years	3.21	2.56	4.25
Strain: great deal/some	55.64	56.20	54.73
Strain: little or none	36.08	34.98	37.83
Strain missing	8.29	8.82	7.44
U.S. born	57.54	59.88	53.80
Heart attack	6.68	6.49	6.98
Hypertension	51.04	56.30	42.64
Diabetes	28.61	30.00	26.40
Arthritis	54.32	59.01	46.82
Total ADL limitations	0.96 (2.00)	1.08 (2.12)	0.75 (1.79)
Depressive symptoms	11.99	14.15	8.53
CESD missing	6.98	6.88	7.13
Under weight	2.09	1.74	2.64
Normal weight	26.36	25.68	27.44
Over weight	33.51	30.91	37.67
Obese	38.04	41.67	32.25
Current smoker	7.72	4.66	12.66
Current drinker	13.77	5.04	27.75
Chamomile use	13.95	17.64	8.06

conferred an advantage to men with a 36% reduction in hazard of death.

Because chamomile contains numerous compounds that may be of benefit in cardiovascular disease and cancer, subanalyses were also completed examining the association of chamomile with cause specific mortality. During follow-up there were 238 deaths from cardiovascular disease (121 women, 117 men), 142 deaths from coronary heart disease (69 women, 73 men), and 84 cancer deaths (46 women, 38 men). The fully adjusted models and the competing risk models showed no statistically significant relationship between chamomile and these specific causes of death for the whole sample, women, or men (data not shown).

Discussion

We examined the effects of chamomile on 7-year mortality in older Mexican Americans. Respondents were asked if they had taken any herbal medicine in the last 12 months. Fourteen percent of the sample (n = 355) reported using chamomile during the study. We found a 29% decreased risk of death among chamomile users compared with nonusers in the total sample. This relationship was no longer significant after adjusting for age, smoking, ADL disability, chronic conditions, and other relevant confounders. However, the reduction in all-cause mortality remained significant in women even after adjusting for demographics, health conditions, and health behaviors.

The nonparametric Kaplan–Meier survival plots show a decrease in all-cause mortality for the entire sample. The plots stratified by gender show that the benefit of chamomile use is only present for women. This finding was further supported by the results of the Cox models for all-cause mortality. The results are consistent with research examining green tea consumption and mortality among adults in Japan, where the relationship between green tea consumption and mortality was stronger among women (Kuriyama et al., 2006). Although we did not find an association with cardiovascular mortality, compared to the Kuriyama study, our sample was considerably older on average which may introduce selection bias.

The reason for a difference in our reported findings between women and men is not clear. It is possible that higher rates of both smoking and alcohol consumption among men introduced residual confounding, neutralizing any potential benefit of chamomile on longevity. However,

Table 2. Cox Proportional Hazards Models for 7-Year Mortality Due to All Causes in Adults in the HEPESE, Wave 4–6, Main Effects and Significant Factors From Full Model, HR (95% CI)

	Total sample	Women	Men
No. of person-years	7,824	4,940	2,884
No. of deaths	644	365	279
Model 1: chamomile, unadjusted	0.71 (0.55–0.92)	0.67 (0.49–0.92)	0.95 (0.64–1.40)
Model 2: chamomile adjusted for demographics[a]	0.78 (0.62–0.99)	0.71 (0.53–0.95)	0.95 (0.64–1.41)
Model 3: chamomile adjusted for demographics and health[b]	0.79 (0.62–1.00)	0.73 (0.55–0.98)	0.92 (0.62–1.36)
Model 4: full model[c]			
Chamomile	0.78 (0.60–1.02)	0.72 (0.53–0.98)	0.86 (0.56–1.31)
Age	1.07 (1.05–1.08)	1.07 (1.05–1.09)	1.07 (1.04–1.09)
Female	0.55 (0.45–0.66)		
Married	1.05 (0.94–1.16)	1.05 (0.91–1.21)	1.05 (0.90–1.22)
U.S. born	1.26 (1.08–1.48)	1.27 (1.03–1.58)	1.23 (0.95–1.58)
Diabetes	1.48 (1.22–1.78)	1.36 (1.07–1.72)	1.67 (1.19–2.34)
ADL limitations	1.19 (1.14–1.24)	1.19 (1.13–1.25)	1.21 (1.12–1.31)
Depressive symptoms	1.28 (1.08–1.52)	1.21 (0.97–1.52)	1.37 (1.04–1.81)
Under weight	1.79 (1.08–2.95)	2.31 (1.08–4.93)	1.36 (0.64–2.89)
Obese	0.77 (0.63–0.94)	0.87 (0.65–1.17)	0.64 (0.47–0.88)

[a]Adjusted for age, sex (total sample only), marital status, education, financial strain, and nativity.
[b]Adjusted for all in two and hypertension, heart attack, diabetes, and arthritis.
[c]Full model also adjusted for education, financial strain, hypertension, heart attack, arthritis, smoking, and alcohol use.

we found no association between smoking and mortality in the final models. An additional explanation may be the relatively low rates of chamomile consumption among men in our sample. Also, the question soliciting information on chamomile use asked about any use in the last 12 months but did not specifically request information regarding duration of use or frequency. Thus, it is plausible that even if men reported use of chamomile they may have used it sporadically or at lower doses than women.

Chamomile has been used as an herbal remedy for a variety of diseases for centuries (Srivastava, Shankar, & Gupta, 2010). It is also reported to be widely used in Mexico and among Mexican Americans. It is, however, unclear how chamomile use is associated with reduced mortality. Recent studies of chamomile showed potential benefits in treating hyperglycemia, diabetic complications (Kato et al., 2008; Yeh, Eisenberg, Kaptchuk, & Phillips, 2003) and anxiety disorder (Amsterdam et al., 2009). Other potential pathways include its cholesterol-lowering, antioxidant, and anti-platelet properties which may convey cardiovascular benefits; however, we did not observe a positive effect on cardiovascular disease mortality after controlling for other factors. Chamomile has also demonstrated the potential to improve daytime functioning in patients with chronic insomnia (Zick, Wright, Sen, & Arnedt, 2011). No population based studies exist examining the association of chamomile consumption with overall and cause-specific mortality.

It is possible that other unmeasured factors, such as frequency and duration of chamomile, level of physical activity and quality of diet, which were not measured in the survey, could influence the results. Women appear to be more frequent users of chamomile than men (Loera et al., 2001), and there may be a dose–response relationship that we were not able to examine in the H-EPESE data. Women also may be more likely to use chamomile at earlier ages and for longer periods of time than men. In addition, women as care takers of family health may be more likely to employ folk remedies such as herbs in their health behaviors (Mendelson, 2003).

Our findings for cause specific mortality showed no significant association between chamomile and cancer mortality or death from cardiovascular disease in general or coronary artery disease in particular after accounting for demographics, health conditions and health behaviors. The lack of significance in these models could be due to the overall large rates of hypertension, diabetes, and obesity in this sample of Mexican Americans. Additionally, when cause-specific mortality is examined the events become quite rare and possibly insufficient in number for our fully adjusted models to detect any effect.

Limitations

There are several limitations that bear mentioning. First, the use of chamomile was based on self-report with no measure of quantity or frequency. Thus, there is no way to quantify any dose response with in intake of the herb. A second limitation is the availability of a reliable measure of chamomile use only in the fourth wave of data. This

had several effects on our estimation. First, it limited the sample size to those respondents who were reached during the Wave 4 interviews. The resulting mean age of the sample was 80 years, an age group already at increased risk of death. In addition, this limited follow-up time to no more than 10 years. An additional limitation is a lack of information on the reasons for herb use.

Conclusions

Chamomile use among Mexican Americans in the Hispanic EPESE was associated with a reduction in all-cause mortality. The decrease in mortality was limited to women after adjustment for covariates. The exact pathway for a reduction in mortality is unknown and represents an important area for future research. Studies with improved granularity in the measure of chamomile use in dosage and duration will lead to a better understanding of the role of chamomile in reduced mortality.

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