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# Acculturation, Medication Adherence, Lifestyle Behaviors, and Blood Pressure Control Among Arab Americans

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## Abstract

**Purpose:** The aim of this study was to examine the relationship between acculturation, medication adherence, lifestyle behaviors (e.g., physical activity, nutrition, weight control), and blood pressure control among hypertensive Arab Americans. **Design:** The study utilized a cross-sectional descriptive design. A convenience sample of 126 participants completed questionnaires and had measures of blood pressure, weight, and height. Forty-six participants were hypertensive and were included in the analysis. **Results:** Only 29.2% of participants reported high medication adherence. High medication adherence was associated with lower diastolic blood pressure, eating a healthy diet, and following lifestyle modifications. Acculturation was significantly associated with physical activity and body mass index. **Conclusion:** Our study found that acculturated participants were more adherent to medications and physical activity and had better blood pressure control. Further studies are needed to explore how acculturation improves adherence and what factors contribute to better adherence in order to design culturally sensitive interventions.

## Keywords

Arab Americans, medication adherence, hypertension, acculturation, self-care management, lifestyle behaviors

## Introduction

Hypertension (HTN) prevalence is increasing in the United States despite effective drug therapy and lifestyle modification programs that target hypertensive patients (Chobanian et al., 2003). Although treatment is available and effective, only 70% of hypertensive American adults are currently receiving treatment and only 46% have controlled blood pressure (BP; Centers for Disease Control and Prevention [CDC], 2011). Controlling BP lowers the risk of stroke by 30%, myocardial infarction by 20% to 25%, and heart failure by more than 50% (World Health Organization, 2004). In 2009, HTN was the primary or contributing cause of death for 348,000 Americans (Heidenreich et al., 2011).

The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7) provides guidelines to prevent and treat HTN. The JNC-7 recommends nonpharmacologic therapy for primary prevention and treatment of HTN (Chobanian et al., 2003). This therapy includes lifestyle modifications such as weight loss for overweight or obese individuals, increased physical activity, reduced dietary sodium intake, and limited alcohol consumption. The JNC-7 report also recommends following the Dietary Approaches to Stop Hypertension (DASH) diet, which emphasizes fruits, vegetables, high-fiber

foods, and low-fat dairy products. Lifestyle modifications should be maintained to increase the efficacy of treatment and decrease cardiovascular disease (Chobanian et al., 2003).

Racial/ethnic disparities in awareness, treatment, and control of HTN persist in the United States (CDC, 2005), thus, more public health efforts should focus on the prevention and treatment of HTN among minorities. It is estimated that there are more than 3.5 million Arab Americans in the United States (Arab American Institute, 2010), who represent a new group to target for the prevention and treatment of HTN to reduce health disparity gaps. The U.S. Census classifies Arab Americans as Whites. Thus, Arab Americans are included in the National Health and Nutrition Examination Survey (NHANES) data as non-Hispanic Whites. Arab Americans are identified as those having an Arabic-speaking ancestry, including Lebanese, Syrian, Egyptian, Iraqi, Jordanian, Palestinian, Moroccan, Algerian, Bahraini, Djiboutian, Kuwaiti, Libyan,

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Omani, Qatari, Saudi, Tunisian, Emirate, and Yemeni (U.S. Census Bureau, 2003). The prevalence of HTN for natives in these countries is relatively high (Bener, Al-Suwaidi, Al-Jaber, Al-Marri, & Elbagi, 2004; Maziak et al., 2007), in some countries it's comparable to the prevalence of HTN in African Americans (Bener et al., 2004; Maziak et al., 2007). In addition, culture, immigration, and acculturation status affect health beliefs and lifestyle behaviors such as physical activity, nutrition, and weight control among Arab Americans (Aqtash, 2007; Hassoun, 1995; Jadalla, 2007; Qahoush, 2006). However, little is known about HTN status among Arab Americans, and no studies have examined HTN adherence behaviors, the influence of acculturation on lifestyle behavior, and BP control in Arab Americans.

Acculturation is defined as a process of cultural and psychological change resulting from interaction between two or more cultural groups (Berry, 2005). Acculturation has been linked to health status and health behaviors of immigrants (Lara, Gamboa, Kahramanian, Morales, & Hayes Bautista, 2005; Salant & Lauderdale, 2003). For example, acculturation has been linked to poor health status for Latino immigrants in the United States; however, acculturation can improve their utilization of health care services and their perceptions of health (Lara et al., 2005).

In a recent study, the prevalence of HTN and pre-HTN in Arab Americans was higher than the national prevalence rate (36.5% vs. 29%) and (39.7% vs. 28%), respectively (Tailakh et al., 2012). Also, HTN awareness and control rates were inadequate and low compared to national data. Higher levels of acculturation and adopting sedentary lifestyle may contribute to the higher HTN prevalence and lower control rate among Arab Americans. Traditional Arab culture plays a positive role in maintaining healthy lifestyle and reducing health risk behaviors to prevent or control HTN. Mediterranean diet, also known as heart healthy diet, is considered the traditional diet of most of Arabs (Hassoun, 1995). Mediterranean diet emphasizes fresh fruits and vegetables, healthy fat (e.g., olive oil), nuts, whole grains, and fresh daily preparation of food. Arab culture sees physical activity as task related activity rather than intentional physical exercise (Qahoush, 2006). Arab lifestyle, in their native countries, is active and involves more exercise in forms of walking, physical work, and gardening. Sedentary lifestyle and HTN prevalence may be greater in Arab Americans, specifically those who are more acculturated to their new society. More acculturated immigrants often adopt the Western lifestyle, which can include sedentary lifestyles and consumption of processed food with high fat and salt content (Hassoun, 1995; Welch, 2003). This hypothesis warrants further investigation. The purpose of this study was to examine the relationship between acculturation, medication adherence, lifestyle behaviors (e.g. physical activity, nutrition, weight control) and BP control in a community sample of Arab Americans.

## Method

### Design

A cross-sectional descriptive design was utilized for this study.

### Sample and Participant Selection

A convenience sample of adult Arab Americans was recruited from various sites in a large urban area on the western coast of the United States. Potential participants were recruited through flyers in worship places and community centers, referrals from religious and community leaders, and word-of-mouth. Inclusion criteria were (a) male or female and self-identified as Arab American, (b) resident of Southern California, (c) lived in the United States for a minimum of one year, and (d) aged 18 years or older. Participants were excluded if they (a) had a history of clinically significant illness, including malignant HTN, congestive heart failure, or renal failure; (b) had psychological or cognitive impairments; or (c) were pregnant. Pregnant women were excluded, because pregnancy can induce transient HTN in normotensive women. Pregnancy was determined by self-report during the informed consent process. All participants were screened to determine that left arm BP measurements were safe. Participants were excluded if they have had post left mastectomy or left arm arteriovenous shunt. Fluency in English language was not required to participate, since the questionnaire was available in both Arabic and English.

### Ethical Considerations

The research protocol was reviewed and approved by the Human Subjects Protection Committee of the university overseeing the project. During the informed consent procedure, all participants were screened to ensure adequate ability to understand the information disclosed and to sign the consent form. Particularly, all participants were asked if they understood what they had consented to. If participants could restate the purpose of the study they were included; if they could not, they were excluded. All participants provided written informed consent, which was available in Arabic and English. The study information was explained in both languages.

### Procedure

Potential participants were approached during their visit to places of worship or community centers and they were invited to participate in the study by providing them with a verbal briefing of the study purposes and procedure as well as inclusion and exclusion criteria. Those who agreed to participate and met the inclusion criteria were informed that the measures are available in English and Arabic. After obtaining written consent in a private room, every participant was seated for 5

minutes, then three BP measures using an automatic BP monitor were obtained at 60-second intervals. Height and weight were also measured using standardized techniques. After that, participants were asked to complete a self-administered questionnaire. All participants completed the questionnaire and the measurements in one session. Measurements and questionnaire completion took on average 30 to 45 minutes. Participants received a \$10 grocery store gift card incentive for completing the measurements and the questionnaire.

## Measures

**Blood Pressure.** Blood pressure was measured using the Omron HEM-705CP automatic BP monitor (HEM-705CP, Omron Corporation, Tokyo, Japan). The automatic BP monitor was validated according to the Association for the Advancement of Medical Instrumentation (AAMI) and the British Hypertension Society (BHS) protocol, which requires testing of a device against two mercury sphygmomanometer readings (O'Brien, Waeber, Parati, Staessen, & Myers, 2001). Blood pressure was measured according to American Heart Association 2005 protocol. After the research participant was seated for 5 minutes, three BP measures were obtained at 60-second intervals, and then the average was computed. All measurements were made on the left arm, which was placed at the level of the heart with a cuff adapted to the arm circumference.

Hypertension and HTN control were defined according to the JNC-7 report guidelines. Hypertension was defined as an average systolic BP 140 mmHg, an average diastolic BP 90 mmHg, and/or self-reported current use of antihypertensive medications. Control of HTN was defined as current use of antihypertensive medication associated with an average BP less than 140/90 mmHg. For diabetic individuals, HTN control was defined as an average BP less than 130/80 mmHg.

**Body Mass Index.** Body mass index (BMI) was used to measure body fat based on height and weight calculation ( $\text{weight}/\text{height}^2$  [ $\text{kg}/\text{m}^2$ ]; National Institutes of Health, 1998). The Omron HB-40 Fat Monitor and Scale (HB-40, Omron Corporation, Tokyo, Japan) was used to measure weight to the nearest 0.2 pound increments up to 330 pounds, with participants wearing light clothing and no shoes. Scales were calibrated before each measurement to reduce reader error. Height was measured by a stadiometer to the nearest 0.5 cm without footwear. Normal weight was defined as a BMI of 18.5 to 24.9  $\text{kg}/\text{m}^2$ , overweight was defined as a BMI of 25 to 29.9  $\text{kg}/\text{m}^2$ , and obesity as a BMI of 30  $\text{kg}/\text{m}^2$  or greater (National Institutes of Health, 1998).

**Demographic Information.** Demographic information was collected through self-administered questionnaires. Information included age, gender, marital status, years of residence in the United States, educational level, employment, income, and health insurance. Also, personal health information was

obtained about smoking and alcohol consumption habits, and medical history.

**Lifestyle Behaviors.** The Health Promoting Lifestyle Profile II (HPLP-II) was used to measure physical activity and nutrition. The HPLP-II is a 52-item scale that measures six health promotion behaviors including: health responsibility, spiritual growth, physical activity, nutrition, interpersonal relations, and stress management (Pender, 1996). The HPLP-II is a self-administered questionnaire with a 4-point Likert-type responses ranging from 1 = *never* to 4 = *routinely*. The HPLP-II was translated into Arabic and was found to be culturally relevant and reliable in Arab Americans in two previous studies (Aqtash, 2007; Jadalla, 2007). Since study questionnaire was available in Arabic and English language, both Arabic and English versions were utilized. Only physical activity and nutrition subscales were used to measure healthy lifestyle behaviors in this study. The reliability of the two subscales have been established in Arab American population (physical activity Cronbach's  $\alpha = .84$ , and nutrition Cronbach's  $\alpha = .71$ ; Jadalla, 2007). In this study, Cronbach's alpha coefficient for physical activity and nutrition subscales English versions and Arabic versions were .81, .73, .80, and .71, respectively.

**Medication Adherence.** The Morisky Medication Adherence Scale-8 (MMAS-8) was used to identify barriers to and behaviors associated with adherence to medications (Morisky, Ang, Krousel-Wood, & Ward, 2008). The MMAS-8 is a scale ranging from 0 to 8 with yes/no response categories, with scores of less than 6 reflecting low adherence, 6 to 7 reflecting medium adherence, and 8 reflecting high adherence (Morisky et al., 2008). The MMAS-8 had a relatively high internal consistency ( $\alpha = .83$ ) and was significantly associated with BP control ( $p < .05$ ; Morisky et al., 2008). Cronbach's alpha reliabilities for the MMAS-8 Arabic version and MMAS-8 English version in the current study were .75 and .79, respectively.

For this study, MMAS-8 was translated into Arabic through the process of forward and backward translation by professional bilingual/bicultural translators according to the Brislin's Translation Model (Brislin, 1986). The MMAS-8 was translated into Arabic by a professional bilingual translator who has a bachelor degree in English language (Arabic native speaker). A blinded backward translation was completed by a second professional bilingual translator. Once the translation and back-translation process was completed, two bilingual and bicultural experts compared and evaluated the translated and the back-translated documents and suggested changes to assure that the documents are linguistically and culturally equivalent. Finally, the MMAS-8 Arabic version was pilot tested in five Arab Americans for linguistic and cultural appropriateness.

**Acculturation.** The Asian American Multidimensional Acculturation Scale (AAMAS) was used to measure level

of acculturation. The AAMAS has four dimensions: cultural identity, language, cultural knowledge, and food consumption (Chung, Kim, & Abreu, 2004). The AAMAS consists of three subscales that include the Culture of Origin Scale (AAMAS-CO), the Asian American Scale (AAMAS-AA), and the European American Scale (AAMAS-EA). Since the research aimed to measure acculturation among Arab Americans, only the AAMAS-CO and the AAMAS-EA subscales were utilized. The AAMAS consists of 15 questions and uses 6-point Likert type responses ranging from 1 = *not very much* to 6 = *very much*. The AAMAS was forward and backward translated by professional bilingual/bicultural translators and tested for linguistic and cultural sensitivity among Arab Americans in Southern California in previous study (Aqtash, 2007). Both Arabic and English versions of AAMAS were used in this study. The AAMAS scales have well established reliability in Arab Americans (Aqtash, 2007). The alpha coefficients of the AAMAS scales ranged from .76 to .89 (Aqtash, 2007). In this study, Cronbach's alpha coefficients of AAMAS-CO and AAMAS-EA English versions and AAMAS-CO and AAMAS-EA Arabic versions were .89, .91, .82, and .85, respectively.

### Data Analysis

Data were analyzed using SPSS 16.0 for Windows (SPSS Inc, Chicago, IL) to examine the relationship between acculturation, medication adherence, lifestyle behaviors, and BP control. The demographic characteristics of the participants were analyzed using descriptive statistics, including means and standard deviations, depending on the level of measurement. The bivariate relationship between acculturation and sample characteristics were examined using the chi-square ( $\chi^2$ ) test. The relationship between acculturation, medication adherence, lifestyle behaviors (i.e., physical activity, nutrition, and weight control) and BP control were examined using Pearson product moment correlation. Marital status, education, and employment variables were dichotomized and coded as 1 = *married*, 0 = *not married*; 1 = *college or higher*, 0 = *high school or less*, and 1 = *any work*, 0 = *no work*, respectively. The median split was used as the cutoff point for defining dichotomous independent variables, including acculturation, physical activity, and nutrition. Medication adherence was dichotomized at a cutoff of 75% (low vs. high/medium adherence level). A cutoff point of 75% of the total adherence score is suggested as the minimal level to achieve good BP control and to identify poor blood pressure control (Morisky et al., 2008). All tests for statistical significance were two-tailed, and  $\alpha = .05$ .

## Results

### Sample Characteristics

A total of 126 adult Arab Americans in Southern California were recruited between the months of November and December 2010. Forty-six participants (36.5%) had HTN

**Table 1.** Sociodemographic Characteristics and Hypertension Risk Factors of the Study Sample (N = 46).

Variables	n (%)	M (SD)	Range
Age, in years		47.6 (10.4)	29-74
Gender			
Male	34 (73.9)		
Female	12 (26.1)		
Education			
High school or less	9 (19.6)		
College or higher	37 (80.4)		
Marital status			
Married	36 (78.3)		
Not married	10 (21.7)		
Length of U.S. residency, in years		17.0 (10.9)	1-40
Arabic language preference	29 (63.0)		
Employed	30 (65.2)		
Monthly income, in US\$			
<2500	17 (39.5)		
2,500-5,000	13 (30.2)		
>5,000	13 (30.2)		
Having health insurance	34 (73.9)		
Uncontrolled hypertension	25 (54.0)		
Body mass index, in kg/m <sup>2</sup>		31.5 (4.1)	24.3-44.7
Current smoker	6 (13.0)		
Drink alcohol	4 (8.7)		
Having diabetes	10 (21.7)		

and were included in the analysis. The mean age of participants was 47.6 years (range 29-74 years). Participants were predominantly men (73.9%), married (78.3%), had college degrees or higher (80.4%), had a monthly income of less than \$5,000 (79.7%), and had health insurance (73.9%). All participants were foreign-born Arab Americans, including Jordanians (28.3%), Palestinians (21.7%), Egyptians (15.2%), Lebanese (15.2%), Syrians (10.9%), and other Arabs (7.7%). The length of stay in the United States ranged from 1 to 40 years ( $M = 17$  years). All participants were born outside the United States; 71.7% had lived in the United States for more than 10 years; and 13% had lived in the United States for less than 5 years (Table 1).

Acculturation was examined in terms of two separate cultural orientations: Arabic culture (AAMAS-CO) and the mainstream culture (AAMAS-EA). Our data indicates that Arab Americans are more oriented toward their original culture than American mainstream culture (Table 3). The mean for orientation to Arabic culture was 5.16 ( $SD = 0.54$ ), while the mean of acculturation to the mainstream culture was 3.75 ( $SD = 1.07$ ).

### HTN Risk Factors and Medication Adherence

For HTN risk factors, 13% smoked, 21.7% had diabetes, 71.7% were obese ( $BMI \geq 30$  kg/m<sup>2</sup>), and 8.7% drank alcohol regularly. Only 52.2% of participants were taking antihypertensive medications, and only 46% had controlled BP (91% of men and 9% of women). The proportion of men and women who reported adhering to their prescribed medication

**Table 2.** Analysis of the Study Variables ( $N = 46$ ).

Variables	<i>M</i>	<i>SD</i>	Min	Max
Orientation to culture of origin	5.16	0.54	3.57	6.00
Language	5.12	0.83	1.25	6.00
Food consumption	5.43	0.76	2.00	6.00
Cultural knowledge	5.51	0.48	4.33	6.00
Cultural identity	4.92	0.91	2.17	6.00
Acculturation to European American culture	3.75	1.07	1.33	5.87
Language	4.15	1.41	1.00	6.00
Food consumption	3.29	1.61	1.00	6.00
Cultural knowledge	3.60	1.19	1.00	6.00
Cultural identity	3.73	1.20	1.50	6.00
Medication adherence	6.80	1.80	0.75	8.00
Physical activity	1.81	0.56	2.12	3.12
Nutrition	2.60	0.53	1.44	3.67

**Table 3.** Correlation Matrix of Selected Individual Characteristics Variables, Medication Adherence, Lifestyle Modifications, and Blood Pressure Control.

Variables	Acculturation	Age	Gender	Years in the U.S.	BMI	Diastolic BP	BP Control	Medication Adherence	Nutrition	Activity
Acculturation	1									
Age	-.043	1								
Gender	.115	.267	1							
Years in U.S.	.417**	.403**	.112	1						
BMI	.309*	.045	-.107	.239	1					
Diastolic BP	-.012	-.350*	-.255	.004	-.064	1				
BP Control	-.164	.013	.338	-.235	-.044	-.636**	1			
Medication Adherence	.390	.120	.502*	-.118	-.088	-.474*	.122	1		
Nutrition	.172	.048	.211	-.048	.032	.013	.019	.547**	1	
Activity	.381**	.235	.185	.168	.041	-.004	-.407*	.287	.324*	1

Note. BMI = body mass index; BP = blood pressure; HTN = hypertension.  
\* $p < .01$  (two-tailed). \*\* $p \leq .05$  (two-tailed).

regimen was 72.7%. The mean score for the medication adherence scale was 6.8 ( $SD = 1.8$ ). Among those who reported taking antihypertensive medications ( $n = 24$ ), only 29.2% participants reported high medication adherence compared with 25% and 45.5% of participants who reported medium and low adherence, respectively. Medication adherence was associated with lower diastolic BP levels ( $r = -.47$ ,  $p = .019$ ); being male ( $r = .50$ ,  $p = .012$ ), eating a healthy diet ( $r = .55$ ,  $p = .006$ ), and following recommended lifestyle modifications ( $r = .40$ ,  $p = .01$ ) were associated with significantly higher score for medication adherence (Table 2). The study participants poorly adhered to lifestyle modifications. For example, only 10.9% ( $n = 5$ ) maintained normal weight (BMI 18.5-24.9  $kg/m^2$ ); the mean for nutrition was 2.6 ( $SD = 0.53$ ) with a range of 1.44 to 3.67; and physical activity was the least frequent lifestyle behavior ( $M = 1.81$ ,  $SD = 0.56$ ) ranging from 2.12 to 3.12 (Table 3). Finally, BP control was associated with lower diastolic BP ( $r = -.64$ ,  $p < .01$ ) and lower level of physical activity ( $r = -.41$ ,  $p < .05$ ).

### Relationship Between Acculturation and HTN

Acculturation was significantly associated with higher physical activity ( $r = .38$ ,  $p < .05$ ) and higher BMI ( $r = .31$ ,  $p < .05$ ). Particularly, speaking English language ( $r = .43$ ,  $p < .01$ ), and knowing and preferring European American culture ( $r = .32$ ,  $p < .05$ ) were associated with higher level of physical activity. However, food preferences were not associated with healthy lifestyle behaviors. Those with low acculturation were most likely to be female, to have less than a college degree, and to be unemployed, whereas those of high acculturation were most likely to be male, adherent to BP medication, employed, and to have a college degree or higher.

### Discussion

Although acculturation of hypertensive Arab Americans may be somewhat beneficial in terms of access to care and socioeconomic status, smoking, diabetes, and obesity tend to be

more prevalent in acculturated Arab Americans. This suggests that acculturation may play a role in HTN control in this population, since diabetes mellitus and higher BMI contribute to ongoing burden of HTN and may complicate HTN treatment and control.

Acculturation increases the risk for HTN and cardiovascular disease (Padilla et al., 2011). In a recent study, HTN prevalence was associated with acculturation in a large multiethnic sample in the United States (Moran et al., 2007). The study indicated that being less acculturated to the United States mainstream culture, specifically being born outside the United States, speaking a language other than English at home, and having fewer residency years in the United States were associated with a decreased prevalence of HTN. Furthermore, some literature suggests an increase in the prevalence of HTN among immigrants to Western countries resulting from adoption of sedentary lifestyles (Hassoun, 1995; Welch, 2003).

Contrary to our findings, previous studies have indicated that being more strongly oriented toward Arab culture among Arab Americans were associated with higher prevalence of diabetes and smoking since acculturated Arab Americans are more likely to adopt healthy lifestyle behaviors (Al-Omari & Scheibmeir, 2009; Jaber, Brown, & Hammad, 2003). Our findings were more equivocal. While acculturated Arab Americans were more physically active and reported healthier diets, they were also more likely to smoke and have diabetes when compared to their less acculturated counterparts. Although acculturation was significantly associated with physical activity, this finding means that acculturated participants were more physically active and does not necessarily mean that they are engaged in regular exercise since the sample was characterized by lack of physical activity (54.3%), and more than 75% of strongly oriented participants to the mainstream culture were obese.

Acculturation as a construct requires a rigorous measure to capture all dimensions of acculturation; disparity among findings with other studies may be because of variation between measurements of acculturation. We examined acculturation in relation to adherence behaviors and HTN control as bidirectional and as an interactive process to improve health instead of seeing health status as an outcome of acculturation. Biculturalism practice helps achieve better health outcomes since this approach maintains ethnic pride of the individual's healthy traditions while assimilating and learning the healthy lifestyle of the mainstream culture.

In this study, acculturation, medication adherence, and lifestyle modifications had no significant relationship with BP control. This is in contrast to what is known about lifestyle modifications as the most crucial approach to prevent and manage BP (Chobanian et al., 2003). Since Arab Americans in this study were more oriented to Arabic culture and less oriented to the mainstream American culture, Arabic culture may play a major role in not adopting healthy lifestyle. In Arabic culture, cardiovascular risk factors,

including physical inactivity, obesity, and smoking are not viewed as health problems (Al-Omari & Scheibmeir, 2009; Hassoun, 1995; Qahoush, 2006; Tohme, Jurjus, & Estephan, 2005). Smoking is viewed as a social custom and is not associated with a stigma (Al-Omari & Scheibmeir, 2009). Physical activity is generally task related, since physical labor and walking are a normal part of everyday activity in Arab countries (Qahoush, 2006). Therefore, lack of intentional physical exercise may not be viewed as a contributor to negative health. Arabs usually do not use preventative screening; thus, they seek medical care for serious and acute health problems (Aboul-Enein & Aboul-Enein, 2010). The aforementioned cultural issues may contribute to poor BP control and lack of adherence to healthy lifestyles among hypertensive Arab Americans. In addition, our study had a small homogeneous sample, which may explain the lack of association among these variables.

Our findings on good medication adherence (54.5%) are consistent with those of previous studies that examined medication adherence using MMAS-8, which reported similar medication adherence rate ranging from 49% to 67.9% in multiethnic studies in the United States (Gatti, Jacobson, Gazmararian, Schmotzer, & Kripalani, 2009; Morisky et al., 2008). Despite good medication adherence in these participants, 46% of the sample had low levels of adherence. There are many factors that contribute to this problem including, antihypertensive drug side effects, silent signs and symptoms of HTN, access to treatment, lack of provider-patient communication, and patient knowledge of and attitude toward HTN (Borzecki, Oliveria, & Berlowitz, 2005).

Health care providers should provide culturally sensitive care that emphasizes the importance of lifestyle modifications to prevent or control HTN, since Arab culture supports individual efforts to change behavior to produce positive health outcomes. Health interventions should be tailored to their level of acculturation and should integrate healthy ethnic traditions such as Mediterranean diet. Also, since physical activity is seen as task related activity in Arabic culture, Arab Americans should be encouraged to walk, use stairs instead of elevators, and gardening instead of focusing on intentional physical exercise.

### Limitations

Using a cross-sectional design limits our ability to make inferences about causality. Because of the small community-based sample, the results may not be generalizable to all Arab Americans. However, this area ranks third in the United States in terms of Arab American population, preceded only by areas in the northern Midwest and the East Coast. Therefore, it not only has relevance to this study sample in Southern California but has opportunities for further study in other parts of the United States as well. Using self-report measures may lead to biased estimates of the study findings. However, use of BP and BMI measurements may enhance



the reliability and validity of study results. It is recommended to perform factor analysis to support the validity of newly developed and revised scales. However, factor analysis was not performed for the Arabic version of HPLP-II, MMAS-8, and AAMAS. Data about religion was collected in this study; however, only one participant was Christian and the rest were Muslims. Future studies should examine the relationship between religion and acculturation among Arab Americans. For future studies, multisite and multigeneration designs should be used to increase the diversity and heterogeneity of the sample to enhance generalizability, and to examine changes and differences between generations. Despite these limitations, the results of this study provide new information on HTN control, medication adherence, HTN risk factors, and acculturation in this minority population.

### Conclusion

It is commonly assumed that more acculturated individuals have higher levels of utilization of healthcare services and better health status than those who are less acculturated. However, the results of this study found that obesity, smoking, and diabetes are prevalent in hypertensive Arab Americans more strongly oriented to the mainstream culture and that these variables may contribute to the ongoing burden of HTN treatment and control. Arabic culture may also contribute to obesity in this population, since overweight is regarded as a sign of wealth in some Arab societies. More acculturated Arab Americans had greater adherence to antihypertensive medications and physical activity and had better BP control. Thus, additional research is necessary to evaluate how acculturation affects HTN management and control and what factors contribute to poor adherence to HTN treatment in order to design culturally appropriate self-care management interventions to control BP in this population.

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