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This work was supported by grants (RO1HL24799 and R37HL36820) from the National Heart, Lung, and Blood Institute, a grant (UO1-HS07397) from the Agency for Health Care Policy and Research, and by administrative support from the Fundación Mexicana Para la Salud.

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Hypertension in the San Antonio Heart Study and the Mexico City Diabetes Study: Sociocultural Correlates

SYNOPSIS

WE EXAMINED THE ASSOCIATION between sociocultural status (assimilation, modernization, and socioeconomic status) and blood pressure among people of Mexican origin living in San Antonio, Texas, and Mexico City. In San Antonio, higher levels of sociocultural status, especially education and structural assimilation, were generally associated with favorable blood pressure. In Mexico City, greater modernization had a consistently beneficial effect on blood pressure in women, but a consistently harmful effect in men. Higher education was associated with lower prevalence of hypertension and greater awareness, treatment, and control of hypertension in both sexes.

Mexican Americans have a lower prevalence and incidence of hypertension than do non-Hispanic whites *(1,2)*, but they are becoming increasingly culturally and socioeconomically heterogeneous. We studied whether 1) differences in assimilation and socioeconomic status (SES) among Mexican Americans living in San Antonio are associated with differences in mean blood pressure, prevalence and incidence of hypertension, and levels of awareness, treatment, and control of hypertension and 2) differences in modernization and socioeconomic status among Mexican nationals living in Mexico City are associated with the same factors and conditions.

Methods

We pooled mean blood pressure and prevalence data from the baseline examination in Phase I (1979 to 1982) and Phase II (1984 to 1988) of the San Antonio Heart Study (SAHS), a large population-based study of diabetes and cardiovascular disease. Participants were 3301 Mexican-American and 1857 non-Hispanic white men and women, ages 25 to 64 at baseline. Incidence data are from the 8-year SAHS follow-up examination (1987 to 1991) of Phase I participants (930 Mexican Americans and 742 non-white Hispanics). Only Mexican Americans are included here.

Sociocultural correlates include structural assimilation, cultural assimilation, and socioeconomic status (SES). We measured structural assimilation (the process by which minority group members enter the clubs, cliques, and institutions of a broader society) *(3)* with a validated standard scale *(4)*. We measured two dimensions of cultural assimilation (the process by which people of one culture adopt attitudes, values, and behavior of another culture) *(3)* by validated standard scales *(4)*.

The scales measure the value placed on preserving Mexican cultural origins and attitudes toward traditional family structure and sex role organization. Assimilation scale scores were divided into four ranked strata using property-space mapping *(4)*. We measured SES by four indicators: education, occupation, household income, and the Duncan Socioeconomic Index (SEI), a global measure based on occupational prestige *(5)*. We divided scale scores for the four SES indicators into four strata based on total distribution of scores.

We took people's blood pressure (based on the first and fifth Korotkoff sounds), with a random-zero sphygmomanometer, while they were sitting down and after a 5-minute rest. We took three consecutive readings and recorded the average of the second and third readings. We defined hypertension as a systolic pressure ≥140 mmHg, a diastolic pressure ≥90 mmHg, or taking antihypertensive medication.

The test for a linear trend to associate sociocultural indicators with blood pressure was multiple regression with age as a covariate, and the test for the same indicators with prevalence and incidence of hypertension (including awareness, treatment, and control) was multiple logistic regression. We analyzed men and women separately. To adjust for multiple comparisons, we used $P < 0.002$ for statistical significance.

The Mexico City Diabetes Study is a large population-based study of diabetes and cardiovascular disease in men and women, ages 35 to 64, and was designed to provide comparative data on people of Mexican origin living in Mexico City and San Antonio. Data in this report are from the first 1702 of 2283 participants.

We examined modernization (a cluster of beliefs, values, and attitudes that accompany modernization of society and equip people to function effectively in that society) and SES. We measured the former with a standardized scale validated in Mexico *(6)*. Education and occupation were indicators of SES, and we divided all scale scores into four or five strata based on the distribution of scores in the total sample.

Blood pressure measurement, definition of hypertension, and data analysis paralleled those described above for the SAHS. To adjust for multiple comparisons, the P-value for statistical significance was $P < 0.003$.

Table 1. Age-adjusted levels of systolic blood pressure in Mexican-American men and women ages 25 to 64 by sociocultural status: San Antonio Heart Study, Phases I and II pooled

	Men				Women			
	Sociocultural Strata				Sociocultural Strata			
	Lowest			Highest	Lowest			Highest
Sociocultural Variables	1	2	3	4	1	2	3	4
				Systolic Blood Pressure				
Socioeconomic Status								
Education	122.8	121.3	120.1	117.5[a]	116.7	113.5	111.7	111.6[a]
Occupation	121.7	120.8	118.2	116.4	114.5	111.4	108.0	111.1[a]
Household Income	121.8	121.7	120.7	119.2	115.1	114.8	113.0	111.2[a]
Duncan SEI[b]	121.7	122.3	120.2	118.9	116.5	115.3	112.7	110.8[a]
Assimilation								
Structural	123.0	122.4	121.2	118.5[a]	117.0	115.3	113.7	111.8[a]
Cultural								
Cultural Value	121.7	122.3	119.5	120.3	116.6	114.8	113.4	114.3
Family Attitude	122.5	121.8	120.2	117.7	115.6	116.4	113.4	111.8[a]
				Diastolic Blood Pressure				
Socioeconomic Status								
Education	74.9	74.8	75.2	73.6	71.7	70.2	69.4	69.5[a]
Occupation	75.2	75.0	74.6	73.5	70.8	69.4	68.6	69.4
Household Income	74.6	75.0	74.6	75.1	71.7	70.8	70.0	69.2[a]
Duncan SEI[b]	74.6	74.9	75.2	74.2	71.7	70.9	70.0	69.5
Assimilation								
Structural	74.5	74.9	75.1	73.6	71.7	70.2	70.6	69.5
Cultural								
Cultural Value	74.2	75.2	74.5	75.1	71.0	71.2	70.2	70.4
Family Attitude	75.2	74.7	74.6	74.7	69.3	71.6	70.4	70.0

[a] Test for linear trend, $P < 0.002$.

[b] Abbreviations: SEI=Socioeconomic index, cultural value=value placed on preserving Mexican cultural origins, family attitude=attitude toward traditional family structure and sex-role organization.

Results

Data from the San Antonio Heart Study indicated that sociocultural status was consistently inversely associated with systolic blood pressure in men and women (Table 1). In men, the association was statistically significant for structural assimilation and for all SES indicators except income. In women, the association was statistically significant for all sociocultural indicators except "value placed on preserving Mexican cultural origin." The average difference in age-adjusted systolic blood pressure between people in the highest and lowest sociocultural strata was about 5 mmHg.

We found no clear pattern of association between any of the sociocultural indicators and diastolic blood pressure among men, nor were the associations statistically significant. Among women, we saw a consistent inverse association between all four SES indicators and diastolic pressure. All associations except occupation were statistically significant. Structural assimilation also was inversely associated with diastolic pressure (P=0.0026), but we found no clear pattern of association with cultural assimilation. The average age-adjusted difference between people in the highest and lowest strata was about 3 mmHg.

Men had a consistent inverse association of hypertension prevalence with all assimilation and SES indicators, although none was statistically significant. We observed a clear pattern of positive associations (19 or 21) of sociocultural indicators with awareness, treatment, and control of hypertension, but again, none of the associations was statistically significant. Women showed no clear pattern of association between sociocultural status and either prevalence or awareness, treatment, and control of hypertension.

Sociocultural status was consistently inversely associated with 8-year incidence of hypertension in both men and women, but the associations were statistically significant only for structural assimilation and education in men. The age-adjusted incidence of hypertension was twice as high among men in the lowest stratum of structural assimilation and education as among men in the highest stratum. Among those with incident hypertension, we found no clear pattern of association between assimilation and awareness, treatment, and control of hypertension in either men or women. Nonetheless, there was a fairly consistent pattern of positive associations between SES indicators and hypertension awareness, treatment, and control in both men (10 of 12 positive associations) and women (11 of 12).

Data from the Mexico City Diabetes Study indicated that modernization and education among women were consistently inversely associated with both systolic and diastolic blood pressure. However, the association was statistically significant only for education and systolic pressure. We found no consistent pattern of association between sociocultural status and blood pressure in men.

Among women, modernization and education were inversely associated with hypertension prevalence, but the association was statistically significant only for education. Among hypertensive women, modernization and education were consistently positively associated with awareness, treatment, and control of hypertension, although none of the associations was statistically significant.

Among men, we found a statistically significant inverse association between education and hypertension prevalence. The age-adjusted prevalence among men with the least education was almost five times higher than among men with the most education (19% in contrast to 4%). These patterns suggest that modernization was associated with higher prevalence of hypertension and lower levels of awareness, treatment, and control.

Discussion

Comparative data on hypertension among men of Mexican origin living in Mexico City and San Antonio suggests that there is a biphasic curve in the relation between modernization and health problems such as cardiovascular disease *(7,8)*. This further suggests that modernization has a harmful effect on health until a transition point is reached, after which modernization is beneficial to health. This biphasic pattern was not observed in women.

In general, developing countries are thought to be on the ascending (harmful) limb of the curve, whereas developed countries are thought to be on the descending limb. In Mexico, modernization was associated with increased hypertension; in the United States, assimilation into a more modernized society was associated with decreased hypertension. In addition, higher levels of education appeared to have a uniformly beneficial effect on blood pressure in women of Mexican origin living in both Mexico City and San Antonio.

We found that among Mexican-American men and women, lower sociocultural status was generally associated with poor blood pressure, which suggests that the burden of disease is borne disproportionately by Mexican Americans with low levels of assimilation and SES, especially those with low levels of structural assimilation and education. Further research is needed to identify the mechanisms (lifestyle, metabolic factors, psychological and social resources, health care access and utilization, comorbidity, and genetic background) that mediate this association in order to design health interventions to reduce hypertension among Mexican Americans.

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