Cardiovascular risk factors in Mexico and the United States: A comparative cross-sectional study between the HABLE and MHAS participants

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Abstract

Introduction: In the United States, information on the Mexican-American population is available through the Health and Aging Brain among Latino Elders (HABLE) study; in Mexico, the results of the Mexican Health and Aging Study (MHAS) are available. **Objective:** To compare the prevalence of cardiovascular risk factors between men and women of the HABLE and MHAS studies. **Method:** The prevalence of hypertension, diabetes, hypercholesterolemia and abdominal obesity was transversely analyzed in 559 HABLE participants and compared with data from 13,663 MHAS participants. The comparison was made using Student's t-test and the chi-square test, according to the type of variable. **Results:** The analysis showed that the prevalence of hypertension (50 %, 95 % CI = 41.8-51.8), diabetes (35.5 %, 95 % CI = 27.6-43.8) and abdominal obesity (59.3 %, 95 % CI = 50.5-68.1) were significantly higher in HABLE males, whereas females had a higher prevalence of diabetes (36.8 %, 95 % CI = 32.2-41.5) and abdominal obesity (89.6 %, 95 % CI = 86.6-92.5). Hypercholesterolemia had a higher prevalence in MHAS females (53.3 %, 95 % CI = 50.3-56.2). **Conclusion:** The prevalence of cardiovascular risk factors was higher in Mexican-American HABLE participants, than in Mexican MHAS participants.

KEY WORDS: Cardiovascular disease. Risk factors. Mexico. Mexican-Americans.

Factores de riesgo cardiovascular en Estados Unidos y México: comparación de los estudios HABLE y ENASEM

Resumen

Introducción: En Estados Unidos se dispone de información acerca de la población mexicoamericana por el Estudio de Salud y Envejecimiento del Cerebro en Latinos Mayores (HABLE); en México se dispone de los resultados del Estudio Nacional de Salud y Envejecimiento en México (ENASEM). **Objetivo:** Comparar la prevalencia de factores de riesgo cardiovascular entre hombres y mujeres de HABLE y ENASEM. **Método:** Se analizó transversalmente la prevalencia de hipertensión, diabetes, hipercolesterolemia y obesidad abdominal en 559 participantes de HABLE y se comparó con datos de 13 663 participantes del ENASEM. La comparación se realizó mediante t de Student y chi cuadrada, según el tipo de variable. **Resultados:** El análisis demostró que la prevalencia de hipertensión (50 %, IC 95 % = 41.8-51.8), diabetes (35.5 %, IC 95 % = 27.6-43.8) y obesidad abdominal (59.3 %, IC 95 % = 50.5-68.1) fueron significativamente mayores en hombres del HABLE, mientras que las mujeres presentaron una prevalencia más elevada de diabetes (36.8 %, IC 95 % = 32.2-41.5) y obesidad abdominal (89.6 %, IC 95 % = 86.6-92.5). La hipercolesterolemia tuvo una prevalencia más elevada en mujeres del ENASEM (53.3 %, IC 95 % = 50.3-56.2). **Conclusión:** La prevalencia de factores de riesgo cardiovascular fue mayor en mexicoamericanos participantes del HABLE, que en mexicanos participantes del ENASEM.

PALABRAS CLAVE: Enfermedad cardiovascular. Factores de riesgo. México. Mexicoamericanos.

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Introduction

In the United States, the main causes of death are heart conditions, cancer and unintentional injuries.¹ In Mexican-Americans, which constitute 63.4 % of Latinos in that country,² cancer is the leading cause, followed by heart conditions and unintentional injuries.³ Data from the National Institute of Statistics and Geography of Mexico (INEGI – *Instituto Nacional de Estadística y Geografía*) show that heart conditions, diabetes and cancer are the top three causes of death in Mexico.⁴ Since several years ago, the World Health Organization has determined that approximately 31 % of all recorded deaths are due to cardiovascular diseases, which constitute the leading cause of death worldwide.⁵

Due to the increase in life expectancy at birth, a larger percentage of people age and develop cardiovascular diseases,⁶ but there are several risk factors such as systemic arterial hypertension, diabetes mellitus, dyslipidemias and obesity, which can be measured, modified or controlled.⁷ Studies conducted in Mexican-Americans (subjects born in Mexico living in the United States and subjects of Mexican ancestry born in the United States), such as the San Antonio Heart Study or the Hispanic Community Health Study/Study of Latinos, have demonstrated that the prevalence of cardiovascular risk factors (CVRF) is higher in Mexican-Americans than in non-Hispanic whites.^{8,9}

In Mexico, the 2012 National Health and Nutrition Survey reported an elevated prevalence of CVRF in the general population,¹⁰ which is consistent with the results of the CARMELA trial¹¹ and of the study carried out by Orozco González et al. in a sample of health workers in two hospitals of the Mexican Institute of Social Security.¹²

Several researchers have suggested that the years of residence in the United States, the language spoken at home and other behavioral changes negatively impact Mexican-Americans lifestyle, and place this population at higher risk of developing CVRF.^{13,14} However, due to methodological limitations and inconsistency in the methods used to quantify these variables, data are contradictory.

In the present analysis, we compare the prevalence of CVRF in a sample of Mexican-Americans residing in the United States, part of the Health and Aging Brain among Elderly Latinos (HABLE) study, with a sample of the Mexican Health and Aging Study (MHAS). The hypothesis was that Mexican-Americans

have a higher prevalence of cardiovascular risk factors than their Mexican counterparts. Understanding the similarities and differences in the distribution of these risk factors on both sides of the border is important in order to develop and implement effective prevention measures.

Method

Epidemiological, descriptive, cross-sectional study of two populations taken from two longitudinal studies: HABLE in the United States and MHAS in Mexico. HABLE analyzes the relationship of different biological factors and diseases such as diabetes, hypertension, depression, etc., with changes in memory, knowledge and aging in Mexican-Americans and non-Hispanic whites. HABLE has been ongoing since 2012 at the Health Science Center of the University of North Texas, in Fort Worth, Texas; it recruits subjects older than 50 years directly from the community, through community recruiters, presentations, press releases, announcements and word of mouth information. The participants undergo a detailed interview on demographic and health information, neuropsychological assessment tests, fasting blood clinical tests, anthropometric measurements and a medical evaluation.

In turn, MHAS is a national longitudinal study in Mexico that has been ongoing since 2001. The interview and data collection are carried out in people older than 50, from urban and rural areas of the 32 states of the country. This study is a collaboration between the University of Texas Medical Branch in Galveston, Texas, the National Institute of Statistics and Geography and the National Institute of Public Health of Mexico. MHAS is investigating diseases and disability associated with aging and assessing the effects of individual behavior, migration, socioeconomic status and community health characteristics.¹⁵ The MHAS questionnaire includes information on demographic data, general health status, chronic conditions, socioeconomic status, migration, family structure and housing condition. Anthropomorphic measurements, blood tests and neuropsychological tests were carried out in a subsample of participants.¹⁶

Both investigations adhered to the relevant ethical conditions for research in human beings and were approved by the corresponding ethics committee. All participants signed an informed consent form.

Between May 2012 and June 2015, 771 participants were admitted to the HABLE study, out of

Table 1. Demographic characteristics according to gender

	Men				Women			
	HABLE (n = 138)		MHAS (n = 5786)		HABLE (n = 421)		MHAS (n = 7877)	
	Mean $\pm$ SD		Mean $\pm$ SD		Mean $\pm$ SD		Mean $\pm$ SD	
Age (years)	63.9 $\pm$ 8.3		68.2 $\pm$ 15.5		60.4 $\pm$ 8.2		67.0 $\pm$ 17.8	
Education (years)	7.7 $\pm$ 4.8		6.1 $\pm$ 5.8		7.7 $\pm$ 4.2		5.2 $\pm$ 5.1	
Marital status married	n	%	n	%	n	%	n	%
Yes	103	74.6	4580	87.8	202	48.2	4323	72.6
No	33	25.4	636	12.2	217	51.8	1630	27.4

HABLE = Health & Aging Brain among Latino Elders, MHAS = Mexican Health and Aging Study.

Table 2. Prevalence of cardiovascular risk factors for the male gender

	HABLE			MHAS			p*
	n	%	95 % CI	n	%	95 % CI	
Hypertension	138	50.0	41.8-51.8	5786	41.2	39.9-42.4	0.03
Diabetes	138	35.5	27.6-43.8	5786	22.4	21.2-23.4	0.0003
Hypercholesterolemia	138	34.8	26.7-42.8	770	40.6	37.1-44.1	0.2
Abdominal obesity	138	59.3	50.5-68.1	767	37.9	34.5-41.3	< 0.0001

*Chi-square test. HABLE = Health & Aging Brain among Latino Elders, MHAS = Mexican Health and Aging Study.

Table 3. Prevalence of cardiovascular risk factors for the female gender

	HABLE			MHAS			p*
	n	%	95 % CI	n	%	95 % CI	
Hypertension	421	50.6	45.9-55.5	7877	54.3	53.2-55.4	0.1
Diabetes	421	36.8	32.2-41.5	7877	27.5	26.5-28.4	< 0.0001
Hypercholesterolemia	421	45.8	41.0-50.6	1083	53.3	50.3-56.2	0.009
Abdominal obesity	421	89.6	86.6-92.5	1112	77.0	74.5-79.4	< 0.0001

*Chi-square test. HABLE = Health & Aging Brain among Latino Elders, MHAS = Mexican Health and Aging Study.

which 559 were of Mexican origin (138 men and 421 women), residents of the Dallas-Fort Worth, Texas area; their data were used for the analysis. The age range was 50 to 85 years. For the analysis of the Mexican population, the free database of the third MHAS 2012 round was accessed.¹⁷ During this round, 18,465 interviews were conducted. Final analysis on diabetes and hypertension was carried out in 13,663 participants (5,786 men and 7,877 women) and total cholesterol and abdominal obesity analysis was conducted in a subsample of 1,882 participants (1,112 women). The age range was 50 to 110 years.

The diagnosis of hypertension and diabetes mellitus was imputed based on previous medical diagnosis self-report or on the use of medications for these two

pathologies. According to established standards, high cholesterol levels were considered at values > 200 mg/dL and abdominal obesity as a waist circumference > 40 inches in men and > 35 inches in women.

Statistical analysis

A descriptive analysis of all study variables was carried out. Demographic characteristics are presented as the mean $\pm$ standard deviation for continuous variables and as frequency and percentage for categorical variables. The prevalence of CVRF was established. Prevalence is reported in percentages with a 95 % confidence interval. The comparison between groups was made using Student's t-test for continuous variables and the chi-square test for categorical variables.

The analysis was divided by gender. A p -value ≤ 0.05 was considered significant. The SPSS statistical program for Windows, version 23 (SPSSW Inc., Chicago, IL), was used for the analysis.

Results

MHAS men and women had a higher mean age than the participants of the HABLE study (68.2 and 67.0, respectively) (Table 1). HABLE participants had a higher level of education, with a mean of 7.7 years both in men and women. Eighty-eight and 75 % of men in MHAS and HABLE reported being married; in women, the difference was larger: 73 % *versus* 48 %, in MHAS and HABLE, respectively. It should be noted that all differences between the samples were statistically significant ($p \leq 0.05$).

The prevalence of CVRF in men is shown in Table 2. The prevalence of hypertension was 50 % (95 % CI = 41.8-51.8), of diabetes 35.5 % (95 % CI = 27.6-43.8) and of abdominal obesity 59.3 % (95 % CI = 50.5-68.1), with the analysis showing that the prevalence of these conditions in HABLE men was significantly higher than in MHAS males. As for hypercholesterolemia, the difference between men in both studies was not statistically significant ($p = 0.2$).

The prevalence of diabetes and abdominal obesity was also significantly higher in HABLE women, with 36.8 % (95 % CI = 32.2-41.5) and 89.6 % (95 % CI = 86.6-92.5), respectively, in comparison with their MHAS counterpart (Table 3). As for hypercholesterolemia, the prevalence was significantly higher in MHAS women, with 53.3 % (95 % CI = 50.3-56.2). The difference in the prevalence of hypertension between women in both studies was not statistically significant ($p = 0.1$).

Discussion

The results of our study suggest that MHAS participants have a lower prevalence of CVRF than HABLE participants. HABLE men had a higher prevalence of hypertension, diabetes and abdominal obesity than MHAS men. Among women, the percentage with diabetes and abdominal obesity was also higher in HABLE in comparison with the MHAS participants. The results were not modified when level of education and marital status were included in the models.

Not all risk factors were higher in women in the United States study. The percentage of women with high cholesterol levels was higher in MHAS women; the explanation for this could lie in the type of diet or

in the level of physical activity. This is consistent with studies that suggest that Latinos with low levels of acculturation in the United States are at higher risk for poorly controlled hypercholesterolemia,¹⁸ and it has even been suggested that the only CVRF that improves with high degrees of acculturation is dyslipidemia.¹⁹ In any case, more detailed research is required in order to elucidate these findings.

The results of our study are consistent with those of other authors, who suggest that Mexicans residing in Mexico are at lower risk for developing CVRF than those living in the United States and their descendants.^{20,21} Although the findings of several analyses have been contradictory, in general, attempts have been made to relate them to the degree of acculturation. Acculturation is defined as the process whereby immigrants adopt the culture, beliefs and practices of the place they reside in.²² It has been suggested that the higher the degree of acculturation, the higher the risk for developing CVRF. The explanation might be that these subjects adopt less healthy behaviors,²³ as well as the high levels of psychological stress associated with immigration.²⁴ It has even been observed that Mexicans living near the US border have a higher risk of mortality associated with cardiovascular problems when compared with inhabitants of other regions of Mexico,²⁵ possibly due to the proximity and influence of the culture on the other side of the border.

There are several limitations in this study: due to its cross-sectional design, it is not possible to assess the effect that diet, physical activity, and stress exert on the prevalence of CVRF; the diagnosis of diabetes and hypertension relied on participants' self-report, which could have caused an underestimation of the prevalence of these factors; in addition, the analyses were not controlled for other confounding variables such as socioeconomic status, access to health services or use of medications, which might have an important effect on the prevalence of CVRF. Some of the strengths of this study include the similarity between both samples: both included community-dwelling subjects who were randomly selected.

Conclusions

Our study contributes to the scarce literature on the prevalence of cardiovascular risk factors on both sides of the border. Our analysis suggests that the prevalence of CVRF was higher in Mexican-Americans enrolled in the HABLE study, than in Mexicans participating in the MHAS study. New studies are needed in order to investigate cardiovascular

problems in Mexicans from both countries, using representative samples and with similar demographic and socioeconomic characteristics. A better insight on these cardiovascular risk factors should lead to the design of interventions aimed at preventing and counteracting the effect these factors have on the health of Mexicans and Mexican-Americans.

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Conflict of interests

The authors declare that they have no conflicts of interest.

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