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Cardiovascular and Diabetes Risk Perception in a Hispanic Community Sample

Vanessa A. Diaz, MD, MS, **Arch G. Mainous, III, PhD**, **Deborah Williamson, DHA, CNM**, **Sharleen P. Johnson, MA**, and **Michele E. Knoll, MA**

Department of Family Medicine (VAD, AGM, SPJ, MEK) and College of Nursing, Medical University of South Carolina, Charleston (DW)

Abstract

Purpose—We examined perceptions of 10-year coronary heart disease (CHD) risk or likelihood of having undiagnosed diabetes or impaired fasting glucose (IFG) with actual risk in a community sample of Hispanic adults.

Methods—We conducted a survey of 183 Hispanic adults (≥18 years) recruited at community events around Charleston, SC. Likelihood of having undiagnosed diabetes/IFG as well as 10-year CHD risk were calculated. Perceived risk was assessed with questions based on the Risk Perception Survey-Diabetes Mellitus.

Results—Over half of respondents (54.8%) underestimated their likelihood of undiagnosed diabetes/IFG and 14.8% underestimated their 10-year CHD risk. Older and overweight respondents were more likely to underestimate their likelihood of undiagnosed diabetes/IFG. Respondents with family history of diabetes were the least likely to underestimate their likelihood of current undiagnosed diabetes/IFG. Respondents with diagnosed hypertension, diabetes, high cholesterol or a family history of heart attack were more likely to underestimate their 10-year CHD risk. Men were more likely to underestimate their risk for diabetes/IFG and CHD risk.

Conclusions—Health education to improve accurate risk perception could improve health promotion for this population.

Keywords

Hispanic; Latino; Cardiovascular disease; Diabetes; Risk Perception; Risk Assessment

Address correspondence to Vanessa A. Diaz, MD, MS; Department of Family Medicine; Medical University of South Carolina; 295 Calhoun Street; Charleston, SC, 29425; 843.792.7241; 843.792.3598 (fax); diazva@musc.edu.

Author Contributions

Study design: Diaz, Mainous, Williamson, Johnson
Acquisition of data: Diaz, Williamson
Data analysis and interpretation: Diaz, Mainous, Johnson, Knoll
Manuscript draft: Diaz, Johnson, Knoll
Statistical expertise: Diaz, Johnson
Acquisition of funding: Williamson
Administrative: Williamson, Johnson, Knoll
Supervision: Diaz, Mainous

Introduction

Cardiovascular disease (CVD) and diabetes are major causes of morbidity and mortality in the Hispanic population, being the first and fourth most common causes of death, respectively.[1] Ethnic disparities are seen in the prevalence and complications related to diabetes; Hispanics are twice more likely to have diabetes than non-Hispanic White adults, and are more likely to have complications such as end-stage renal disease or related fatalities than non-Hispanic Whites.[2–4] Hispanics are also more likely to be affected by certain risk factors for CVD and diabetes such as metabolic syndrome, sedentary lifestyle and obesity.[1,5] Furthermore, once identified, CVD, diabetes and their associated risk factors tend to be undertreated in this population.[5–9]

Hispanics are less likely to receive preventive care than their White counterparts, and being diagnosed with diabetes or CVD often occurs later in the course of these conditions, leading to more complications.[5,10–12] This trend is concerning, as much of the morbidity and mortality from diabetes and CVD can be mitigated through early recognition and treatment.[13–15] Part of this disparity may be explained by a lack of utilization of the health care system, with more than one-fourth of Latino adults not having a health care provider, and a similar proportion reporting not obtaining any health care information from medical personnel in the past year.[16] A number of factors that decrease access to care, such as lack of health insurance and language barriers, disproportionately impact the Hispanic population.[4,17]

> This study evaluated two distinct but intertwined concepts: an individual's assessment of their risk of currently having or developing a disease, and his or her risk-score determined likelihood of having or developing disease.

A lack of awareness regarding symptoms of common chronic conditions and their risk factors may also limit access to health care. According to the Health Belief Model, an accurate perception of one's risk for, or susceptibility to, a condition is necessary to motivate one to take protective action.[18] In order to evaluate perception of risk in a community sample of Hispanic adults, this study evaluated two distinct but intertwined concepts: an individual's assessment of their risk of currently having or developing a disease, and his or her risk-score determined likelihood of having or developing disease. Identifying areas with a lack of concordance between actual and perceived risk may help improve health promotion by enabling educational efforts to focus on areas with less concordance. Improving identification and subsequent care for these conditions in the Hispanic population may help decrease health disparities in CVD and diabetes.

Methods

Participants

Adults aged ≥18 years who self-identified as Hispanic or Latino were recruited at community health fairs and health education meetings that had focused outreach to the Hispanic community in the greater Charleston, SC area. Specifically, the health fairs were held at apartment buildings known to house mostly Hispanic residents, during visits from the Mexican Consulate, and at health education meetings for parents held at an elementary

school with high Hispanic student enrollment. This study was approved as exempt research by the Medical University of South Carolina (MUSC) Institutional Review Board.

Survey

A survey was developed that included questions regarding demographics, current health status and health behaviors using information from previously published questionnaires. The survey was translated into Spanish by a translator certified by the American Translators Association to translate between Spanish and English, then back-translated by a native speaker to further ensure accurate translation. The Spanish language survey was also pilot-tested for readability, flow and content using think-aloud cognitive interviews with five native Spanish-speakers. The survey was administered by a study investigator who is a native Spanish speaker, or trained interviewers who included native Spanish speakers or bilingual registered nurses.

Demographic Variables

Demographic variables included sex, age, years of education completed, marital status, and regular source of health care. Wording for these questions has been previously used in the National Health and Nutrition Examination Survey (NHANES).[19] Additionally, the Single Item Literacy Screener was used to identify patients with limited reading ability that required help reading health-related materials.[20] Acculturation status was evaluated using the Brief Acculturation Scale, which consists of four items that describe preferences in language use and has psychometric properties comparable to other published scales.[21] As recommended by Marin et al,[22] the points from the responses to each question (ranging from 1 point for only Spanish to 5 points for only English) were averaged to produce a score from 1 to 5. Country of birth and years lived in the United States were also assessed as a proxy for acculturation status.

Health Status

Self-reported general health status was assessed. Respondents were asked about having a personal history of hypertension or high blood pressure, heart attack, stroke, high cholesterol and diabetes. Family history of heart attack, stroke and diabetes were also assessed. Wording for these questions has been previously used in the NHANES.[19] The Patient Health Questionnaire-2 (PHQ-2) was used to identify individuals at risk for a depressive disorder. A score of 3 or more has a positive predictive value of 75.0% for a depressive disorder.[23]

Health Behaviors

Smoking status and physical activity were assessed. Physical activity was based on two questions, the first asking how many days per week respondents participated in moderate exercise as part of either work or leisure activity, the second how much time was spent on these type of activities in a typical day. An active lifestyle was defined as participating in moderate exercise at least 5 days a week for at least 30 minutes per day, as recommended by the American Heart Association.[24] Fruit and vegetable consumption was calculated by asking the number of servings consumed per day. Wording for these questions has been previously used in the NHANES and National Health Interview Survey.[19]

Physical Examination

In addition to answering survey questions, participants had their blood pressure, heart rate, height and weight obtained by trained medical personnel. Blood pressure was measured with the participant sitting, consistent with American Heart Association guide-lines.[25] Weight was measured on a digital scale with the individual wearing light clothing. Height was measured with the participant standing on the floor with the heels of both feet together and the toes pointed slightly outward at approximately 60 degrees, with the body weight evenly distributed and both feet flat on the floor. Participants could also provide height information via self-report. Height and weight were used to calculate body mass index (BMI)(weight in kg/height in m^2). A majority of participants also had a random blood sugar and total cholesterol measurement obtained using point-of-care testing systems.

Likelihood of Having Undiagnosed Diabetes or Impaired Fasting Glucose

The likelihood of currently having undiagnosed diabetes or impaired fasting glucose (IFG) was calculated using the Tool to Assess Likelihood of Fasting Glucose Impairment (TAG-IT). This is a screening tool that was developed to identify those most likely to have abnormal fasting glucose, hyperglycemia and undiagnosed diabetes. The variables in the TAG-IT score are age, sex, BMI, family history of diabetes, resting heart rate, and history of hypertension.[26]

Assessment of 10-Year Coronary Heart Disease Risk

The Personal Heart Early Assessment Risk Tool (HEART) score was used to determine risk of coronary heart disease (CHD). This tool is a risk score developed using exclusively self-reported data. The Personal HEART score identifies a 10-year risk for CHD and it is comparable in predictive ability to the Framingham Risk Score and European SCORE. The Personal HEART score can indicate whether a person is at low, moderate or high risk for CHD. The variables needed to calculate a personal HEART score for men are age, diabetes, hypertension, hypercholesterolemia, smoking, physical activity, and family history. For women the variables include age, diabetes, hypertension, hypercholesterolemia, smoking, and BMI.[27]

Perceived Risk Status

Perceived risk was based on questions similar to those previously published in the Risk Perception Survey-Diabetes Mellitus (RPS-DM). The RPS-DM is a survey that measures relative risk perception of developing diabetes and its complications. In the survey that was conducted we used the questions regarding the personal risk subscale that asks if the patient has ever been told if they had certain health problems, such as heart attack, diabetes, or stroke. The survey then asks respondents to rate their risk for these conditions as almost no risk, slight risk, moderate risk or high risk as a way to gauge what they thought of their own personal health risk.[28] For this study, respondents were asked about their risk of having a heart attack in the next 10 years, as was well as their risk of currently having diabetes or elevated sugar.

In order to better correlate an individual's perceived risk to his or her calculated risk, we also assigned a percent risk range to each of these categories. For the Personal HEART

score we used the risk categories and percent risks reported in Mainous 2007.[27] Because TAG-IT was designed as a screening tool, percent risks for predefined score ranges were not reported for the tool. In order to develop risk categories and percent risks to correspond with TAG-IT score ranges, TAG-IT scores were calculated in NHANES 1999–2004 for non-pregnant adults aged 20–65 with measured fasting glucose who had not been previously diagnosed with diabetes. Based on the percent of people with each score who had a fasting plasma glucose of ≥100 mg/dL, which identifies those with IFG, we assigned score ranges and percent risks to risk level categories.[26]

Analysis

Surveys were excluded from analysis if they were: (a) missing data needed to calculate a personal HEART score or they did not respond to the self-assessed heart attack risk question, as well as (b) missing data needed to calculate a TAG-IT score or they did not respond to the self-assessed likelihood of undiagnosed diabetes or IFG question. Surveys missing data for only (a) or only (b) were included in the analyses for which they did not have missing data.

The prevalence of demographic characteristics, health characteristics, calculated disease risk, and perceived disease risk were assessed separately for men and women. Differences in means were compared using independent sample *t* tests, and categorical differences were compared using χ^2 tests. If one or more expected values in a categorical comparison were too small for a valid χ^2 test, a Fisher exact test was used instead.

A personal HEART score was not calculated for respondents who reported having had a heart attack, and a TAG-IT score was not calculated for respondents who reported having diabetes. Kappa statistics were calculated to evaluate agreement between calculated and perceived risk after each type of risk was categorized into almost no or slight risk vs moderate or high risk.

Respondents whose calculated personal HEART or TAG-IT disease risk category was higher than the disease risk category they selected on the survey were determined to be underestimating their disease risk. Respondents in various demographic and risk factor categories who underestimated their disease risk were compared to respondents not underestimating their risk using χ^2 tests or Fisher exact tests depending on category size.

Stepwise logistic regressions with a significance level of .05 were used to identify which demographic and risk factors were independently associated with people underestimating their disease risk for CHD and diabetes. The variables evaluated in both stepwise regressions were sex, age, education, acculturation score, time lived in the United States, BMI, reading ability, diagnosis of hypertension, diagnosis of high cholesterol, smoking, active lifestyle, fruit and vegetable intake, and family history of stroke. Additional variables evaluated in the CHD stepwise regression included family history of heart attack and diagnosis of diabetes. Additional variables evaluated in the diabetes stepwise regression included family history of diabetes and diagnosis of heart attack.

Results

Demographic and health characteristics are presented in Table 1. A majority of respondents were born in Mexico (83.6%), with smaller proportions from Central America (9.3%), South America (3.3%), and Puerto Rico (2.7%). Only one respondent was born in the United States. The mean time living in the United States for foreign-born individuals was 9.4 years.

Perceived and calculated risk data are presented in Table 2. Men had higher calculated likelihood for undiagnosed diabetes/IFG and 10-year CHD risk, but there were no significant differences in perceived risk by sex. Kappa statistics for both undiagnosed diabetes/IFG and CHD risk showed poor agreement between an individual's calculated and their perceived status, with kappa=.006 and .04, respectively.

Over half of respondents underestimated their likelihood of undiagnosed diabetes/IFG, while 14.8% underestimated their CHD risk. Table 3 presents proportions of respondents underestimating their risk by individual demographic and risk factors. Additionally, there were no significant differences by number of years in the United States, reading ability, or physical activity.

Stepwise logistic regression showed a higher odds of underestimating likelihood of diabetes/IFG for men (OR: 3.33, 95% CI: 1.15–7.65), respondents over 45 years (OR: 13.44, 95% CI: 3.19–56.75) and respondents with BMI≥25 (OR: 4.82, 95% CI: 1.71–13.59). This regression also showed lower odds of underestimating diabetes/IFG for respondents with limited reading ability (OR: .33, 95% CI: .14–.77) or a family history of diabetes (OR: .24, 95% CI: .11–.55). Evaluating 10-year CHD risk, stepwise logistic regression showed higher odds of underestimating risk for men (OR: 10.74, 95% CI: 2.74–42.10), respondents with a diagnosis of hypertension (OR: 4.74, 95% CI: 1.42–15.85), high cholesterol (OR: 7.15, 95% CI: 1.98–25.79) or diabetes (OR: 16.45, 95% CI: 1.94–139.34) or a family history of heart attack (OR: 8.70, 95% CI: 2.45–30.88). When comparing individuals with an acculturation score of 1 vs more than 1, those with a lower acculturation score had lower odds of underestimating their CHD risk (OR: .13, 95% CI: .03–.65).

Discussion

According to the Health Belief Model, individuals will generally not seek preventive care or receive health screenings unless they have sufficient motivation to make health issues salient or relevant. Motivation is increased when individuals believe they are susceptible to a serious health problem and that adhering to health recommendations will reduce health risks.[18] Thus, an important part of health promotion is increasing individual's awareness of their current risk status in order to encourage the adoption of healthy behaviors that will decrease risk. If patients do not perceive themselves to be at risk they are unlikely to change their behavior. In this study, a large proportion of individuals underestimated their likelihood of undiagnosed diabetes or IFG. This underestimation is concerning, as it may lead Hispanics to engage in behaviors that increase diabetes risk and also delay screening for and identification of diabetes.[16] This concern is especially pertinent in the Hispanic population, as health disparities in diabetes prevalence and outcomes could be improved by

decreasing the prevalence of risk factors and identifying diabetes earlier in the course of disease, in addition to increasing adherence to recommended treatment regimens.

Older and overweight or obese individuals were more likely to underestimate their likelihood of having undiagnosed diabetes or IFG, in spite of the fact that excess weight is a well accepted risk factor for diabetes. Similarly, more than a third of individuals with diagnosed hypertension, diabetes or high cholesterol underestimated their 10-year CHD risk, although these are also well accepted risk factors for CHD. It is unclear whether these findings reflect lack of knowledge due to poor socioeconomic or educational status or an element of denial on the part of the respondents. These findings are consistent with previous studies that show poor knowledge regarding heart disease risk factors, with less than a third of respondents in one nationally representative sample being able to identify high cholesterol and a family history as risk factors, and 19% and 7% identifying hypertension and diabetes as risk factors, respectively.[29] It is particularly concerning that individuals with diagnosed conditions that increase risk for CHD underestimate their risk, as that may reflect either a lack of counseling or ineffective counseling by health care providers on the impact of these conditions. Similar findings are seen in other studies that demonstrate understanding of CHD risk in primary care populations is limited, with up to four out of five high-risk patients demonstrating incorrect optimism regarding their risk.[30–32] This suggests that improved health education that not only identifies individual risk factors but also helps individuals understand the cumulative risk the factors impart is needed as it could help improve health promotion in this vulnerable population by encouraging the adoption of healthy habits.

> An important part of health promotion is increasing individuals' awareness of their current risk status in order to encourage the adoption of healthy behaviors that will decrease risk.

Individuals with a family history of diabetes were less likely to underestimate their likelihood of having diabetes or IFG. One possible reason for this finding is that individuals are more knowledgeable because they received a greater exposure to diabetes education through interactions with affected family members, or have an exaggerated understanding of the effects of genetics on diabetes due to a sense of fatalism in regards to the inheritance of diabetes. It is unclear why a family history of heart attack did not have a similar effect. It is possible the variation in these results is due to the difference between having a chronic condition such as diabetes, that requires daily self-management behaviors such as glucose monitoring, vs having had an acute event that may have happened years ago and did not have a noticeable effect on physical function. Thus, diabetes may have a more obvious impact on the person with diabetes and his or her family members. Conversely, it may be that education regarding the risk imparted by a family history of diabetes has been better disseminated to the Hispanic population than education on the risk imparted by a family history of heart attack. Individuals with less acculturation and limited reading skills also were less likely to underestimate their risks for CHD and diabetes/IFG, respectively. It is unclear why this association was seen, but may be due to obtaining a false sense of security with more exposure to mainstream culture through acculturation or reading materials, which

may lead to the perception that unhealthy behaviors such as smoking, being obese and sedentary are the norm.

A strength of this study is that it assesses two different concepts, currently having undiagnosed disease as well as 10-year risk of disease. Consequently, we were able to assess individuals' perceptions related to their current evaluations of themselves as well as their evaluations of their behavior and how it may affect future disease. Of note, a lower proportion of individuals underestimated their 10-year CHD risk than their current likelihood of having diabetes/IFG. This may be due to an inherent tendency to more readily accept a higher (more accurate) risk if it is projected to occur in the future or due to the fact that a heart attack is a more concrete outcome to predict than diabetes or IFG, although the prevalence of diabetes and IFG is higher in this population than CHD. Further studies would be needed to evaluate underlying reasons for these findings. Regardless, the proportion underestimating their risks suggests the need for improved health education to promote accurate risk assessments.

There are several limitations to this study. First, this is a convenience sample, with many individuals being approached at health fairs. Individuals attending health fairs may be more concerned about having health conditions, which is prompting their attendance. Surveying individuals who are more interested in their health would lead to an underestimation of those not aware of their risks in the larger community. Second, the sample survey includes many younger adults who may not have a high prevalence or risk for disease. As older adults were more likely to underestimate their risks, evaluating a larger proportion of older adults could reveal an even larger discordance between individual perceptions and calculated assessments. Third, the use of self-reported data for risk calculation is less ideal than using only clinically derived measures. This study uses both measured data, such as blood pressure and BMI, and self-reported data to calculate risk. Finally, results from the stepwise regressions had confidence intervals of varying size, due to differing proportions of respondents for the categories. Therefore, although all included variables had significant results, the point estimates are not precise.

In conclusion, a large proportion of Hispanics underestimated their likelihood of undiagnosed diabetes or IFG. A higher proportion of men, older and overweight individuals underestimate their likelihood. Men and respondents with diagnosed hypertension, diabetes or high cholesterol or a family history of heart attack were more likely to underestimate their 10-year CHD risk. Health education to improve accurate perceptions of health status is necessary to improve health promotion in this at-risk population.

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Table 1

Demographic characteristics and prevalence of risk factors

	Total sample	Men	Women	*P*
N	183	90	93	
Age, mean	37	38	36	.20
Years of education completed, mean	8.6	8.5	8.7	.80
Marital status, %				.66
Married/civil union	74.6	77.5	71.7	
Divorced/separated/widowed	6.1	5.6	6.5	
Single	19.3	16.9	21.7	
Limited reading ability, %	62.6	68.5	57.0	.11
Acculturation score, mean	1.5	1.6	1.5	.11
General health status, %				.51
Excellent/very good	13.7	15.6	11.8	
Good/fair	83.1	80.0	86.0	
Poor	3.3	4.4	2.2	
Clinic is usual source of care, %	54.1	56.7	51.6	.49
Medical history of: %				
Hypertension	27.6	32.2	23.1	.17
Heart attack	1.7	1.1	2.2	1.0
High cholesterol	24.0	23.3	24.7	.82
Diabetes	4.4	5.6	3.2	.49
Family history of: %				
Heart attack	17.5	16.7	18.3	.77
Stroke	11.5	10.0	12.9	.54
Diabetes	41.5	37.8	45.2	.31
Smoking, %	14.2	20.0	8.6	.03
Active lifestyle, %	50.3	63.3	37.6	, .001
Fruit and vegetable intake, mean number daily servings	1.9	1.8	2.1	.12
Systolic blood pressure, mean mm Hg	129	135	123	, .001
Diastolic blood pressure, mean mm Hg	78	82	74	, .001
Body mass index, mean kg/m^2	29.5	30.1	28.9	.12
Random serum glucose, mean mg/dL	126	127	125	.88
Total cholesterol, mean mg/dL	199	200	198	.78

Table 2

Calculated and perceived risk for coronary heart disease (CHD) and likelihood of having undiagnosed diabetes or impaired fasting glucose (IFG)

		Total sample	Men	Women	*P*
Calculated 10-year CHD Risk, %	Almost none/slight, <10%	77.8	61.4	94.3	<.001
	Moderate, 10–20%	18.8	34.1	3.4	
	High, >20%	3.4	4.6	2.3	
Calculated likelihood of undiagnosed diabetes/IFG, %	Almost none, <10%	4.5	.0	8.5	<.001
	Slight, 10–25%	31.9	12.0	50.0	
	Moderate, 25–50%	34.4	34.7	34.2	
	High, >50%	29.3	53.3	7.3	
Perceived 10-year CHD risk, %	Almost none/slight, <10%	63.1	67.4	58.9	.38
	Moderate, 10–20%	26.3	24.7	27.8	
	High, >20%	10.6	7.9	13.3	
Perceived likelihood of diabetes/IFG, %	Almost none, <10%	32.6	28.2	36.7	.051
	Slight, 10–25%	28.0	34.1	22.2	
	Moderate, 25–50%	21.7	25.9	17.8	
	High, >50%	17.7	11.8	23.3	

Table 3

Association between demographic characteristics and risk factors and underestimation of coronary heart disease (CHD) risk and likelihood of undiagnosed diabetes or impaired fasting glucose (IFG)

		% Underestimating likelihood of undiagnosed diabetes/IFG	*P*	% Underestimating 10-year CHD Risk	*P*
Total Sample		54.8% *N*=157		14.8% *N*=176	
Sex	Male	68.0	<.01	26.1	<.001
	Female	42.7		3.4	
Age	<45 years	44.7	<.001	11.6	.02
	≥45 years	91.2		26.3	
Education	<12 years	50.9	.101	8.4	<.001
	≥12 years	65.2		29.6	
Acculturation score 1–5	=1	51.1	.47	5.2	.01
	>1	57.4		19.8	
BMI	BMI≥25	62.1	<.001	17.0	.09
	BMI<25	27.3		5.7	
Smoker	Yes	52.4	.81	23.1	.20
	No	55.2		13.3	
General health status	Excellent / very good	71.4	.10	20.8	.37
	Good / fair / poor	52.2		13.8	
Family history of diabetes	Yes	35.4	<.001	9.6	.10
	No	68.5		18.5	
Family history of heart attack	Yes	64.3	.26	30.0	.02
	No	52.7		11.6	
Diagnosis of hypertension	Yes	62.5	.26	38.8	<.001
	No	52.2		5.5	
Diagnosis of high cholesterol	Yes	52.6	.76	38.5	<.001
	No	55.5		8.0	