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Perceptions of Cardiac Risk among a Low-Income Urban Diabetic Population

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Abstract

objective—The purpose of this study was to determine the perception of risk for the development of cardiovascular disease (CVD) in a population of urban, low socioeconomic status (SES) patients with type-2 diabetes but no known CVD and to identify factors associated with perceived risk.

Methods—This cross-sectional study enrolled 143 patients, predominantly middle-aged African American women, at urban community clinics. Demographic and socioeconomic characteristics, medical history, health behavior, depressive symptoms, and perception of risk for CVD were measured.

Results—Seventy-five percent of participants perceived that they had a 50% or smaller risk of developing CVD. Increased levels of perceived risk for the development of CVD were significantly and independently associated with increased depressive symptoms, poorer perception of general health, and higher intake of dietary fat.

Conclusions—Comprehensive care for urban, poor, diabetic patients calls for effective communication of CVD risk and adequate treatment of depressive symptoms and traditional CVD risk factors.

Keywords

Diabetes; cardiovascular disease; primary care; prevention

Cardiovascular disease (CVD) is the leading cause of death among people with diabetes mellitus in the United States, of whom at least 65% die from some form of heart disease or stroke.¹ Heart disease death rates among adults with diabetes are two to four times higher than the rates for adults without diabetes.¹ Adequate management of CVD risk factors and promotion of risk-reducing health behaviors in individuals with diabetes is imperative.

Perceptions of CVD risk have been positively associated with a desire to make risk-reducing behavioral changes and with actual behavioral change in some studies.^{2–3} General knowledge and awareness of a potential health hazard may be a necessary first step in taking action to reduce the threat of disease.⁴ More knowledge is needed about what people with diabetes, especially those of low socioeconomic status (SES), know about their risk for CVD and about what factors are associated with their perceptions of risk so that health care professionals can better help patients with diabetes prevent the development and progression of CVD.

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The purpose of this study was to determine the perception of risk for the development of CVD in a population of urban, low-SES patients with type-2 diabetes but no known CVD and identify factors associated with their perceived risk.

Methods

Design, setting, and sample

This descriptive cross-sectional study was conducted at urban community clinics as part of baseline data collection in a larger randomized controlled trial of an intervention to reduce total CVD risk in high-risk patients. The community clinics are federally-qualified community health centers who serve the urban poor in Baltimore, Maryland.

To qualify for the parent study, patients at the community health clinic had to have at least one uncontrolled CVD risk factor (blood pressure, cholesterol, or hemoglobin A1c) according to national guidelines; be age 18 years or older; and speak English. For this sub-study, patients were included if they had a diagnosis of type 2 diabetes and no diagnosed CVD. A total of 143 patients were included in the sample. The protocol was approved by the Johns Hopkins University School of Medicine Internal Review Board and all participants provided written informed consent.

Data collection

Trained interviewers administered a multipart questionnaire to participants. Demographic and socioeconomic characteristics, medical history, health behavior, depressive symptoms, and perception of risk for CVD were measured. Demographic and socioeconomic information included age, sex, race/ethnicity, income, and years of formal education. Depression was measured by the standardized Center for Epidemiologic Studies Depression Scale.⁵ A score over 16 was indicative of depressive symptoms. General health perception was evaluated using one item from the Euro-Qol questionnaire.⁶ This question asks patients to rate their overall health on a visual analog scale ranging from 0 (worst imaginable health state) to 100 (best imaginable health state). Comorbidity was assessed by abstracting data from the medical history at the time of enrollment. The comorbidity index developed by Charlson⁷ was used to quantify the extent of comorbid disease.

Level of moderate physical activity, smoking status, and intake of dietary fat (behavioral characteristics) were evaluated using standardized approaches. Physical activity was evaluated with the Stanford 7-Day Physical Activity Recall.⁸ For the purpose of this analysis, we focused on the self-reported estimate of the number of hours spent in moderate activities over the previous seven days. Smoking status was assessed by self-report with standard questions and confirmed by measuring the level of carbon monoxide in exhaled air with a portable carbon monoxide monitor manufactured by Vitalograph Inc. More than 8 ppm on an average of two readings was considered a smoker. Dietary intake of fat was assessed with the standardized Block Food Frequency Questionnaire.⁹

Perceived risk for CVD was measured on a visual analog scale with one end labeled 0 (no risk) and the other end labeled 100 (very high risk). Participants were asked to make an X on the line after being asked, "This scale represents your risk of developing heart disease. What number between 0 and 100 do you think is your risk for developing heart disease?" The distance on the line was measured and quantified as a number ranging from 0 to 100.

Risk factors were measured objectively. Following a 12-hour fast, blood was drawn to measure lipids and hemoglobin A1c (HbA1c). The Johns Hopkins Chemistry Laboratory performed direct measurements of total cholesterol, triglycerides, and high-density lipoprotein cholesterol (HDL-C). Low-density lipoprotein cholesterol (LDL-C) was estimated using the Friedewald

equation.¹⁰ In the event of triglyceride levels greater than 400 mg/dL (4.52 mmol/L), direct measurement of LDL-C through ultracentrifugation methods was performed. Hemoglobin A1c also was measured in the Johns Hopkins Chemistry Laboratory using high pressure liquid chromatography. Blood pressure was measured according to JNC VII guidelines, following five minutes of quiet rest, using the right arm with the person seated in a chair with arm supported at heart level, three times during each clinic visit using the OMRON HEM-907XL device (Omron Health care Inc., Bannockburn IL). The three blood pressure readings were averaged to obtain one measure of both systolic and diastolic pressure. Weight and height were measured with research participants in light clothing with shoes removed using a stadiometer and balance scale. Body mass index (BMI) was calculated as weight in kilograms/height in meters squared.

Analysis

Descriptive statistics of participant characteristics, perceptions of risk, health behaviors, and objective risk factors were calculated. Simple linear regressions delineated the bivariate associations of the explanatory variables of smoking status, body mass index (BMI), systolic and diastolic blood pressure, LDL-C, HDL-C, HbA1c, activity level, dietary fat intake, depressive symptoms, perception of health, and age (with the response variable being perception of risk for CVD). Variables with statistically significant bivariate associations were entered into multiple regression models to determine factors independently associated with perception of risk for CVD. SPSS version 10 (SPSS Inc., Chicago, IL) was used for all analyses.

Results

Characteristics of participants

Characteristics of the 143 study participants are presented in Table 1. The sample was predominantly made up of middle-aged Black women. The majority had at least a high school education or equivalency diploma; however, more than two-thirds had annual household incomes below \$30,000. There was a high prevalence of traditional CVD risk factors in this sample of diabetic patients. Almost one-third of patients were current smokers, two-thirds had uncontrolled hypertension, more than half had uncontrolled hypercholesterolemia, and almost three-quarters of the patients had three or more CVD risk factors out of control. More than one-third of participants reported depressive symptoms (CES-D score greater than 16); however, self-rated perception of overall health was relatively good (mean score of 66 ± 18 on a scale of 0–100).

Risk assessment for CVD

Responses to the perceptions of risk for CVD question indicated that a high proportion of this diabetic population perceived that they were at risk for the development of heart disease within the next five years. (Figure 1) Seventy-five percent perceived that they had a 50% or greater risk of developing heart disease.

Increased levels of perceived risk for the development of heart disease were significantly associated with perception of poorer overall health, greater depressive symptoms, younger age, higher intake of dietary fat, and higher BMI, but not objective CVD risk factors of level of cholesterol, blood pressure, HbA1c, or smoking status. In a multivariate model adjusting for age and BMI, the significant independent explanatory variables of perception of risk for heart disease were depressive symptoms, perception of general health, and intake of dietary fat (Table 2).

Discussion

Patients with type 2 diabetes but no known CVD appeared overly pessimistic with regard to their absolute CVD risk. Uncontrolled risk factors of high cholesterol, high blood pressure, high HbA1c, and current smoking, on the other hand, did not relate to patients' estimates of CVD risk. Depressive symptoms were independently associated with risk perception, which indicates that interventions to communicate risk information and promote healthy lifestyle behaviors may need also to address patient's depressive symptoms.

Individual's perception of risk for specific health problems is frequently incongruent with their actual risk. Numerous studies have found that most people judge themselves to be at lower risk of negative events than the average person similar to them and tend to underestimate their vulnerability to adverse health events.^{11–13} This unrealistic optimism can create a discrepancy between perceived and actual risk that may affect compliance with medical recommendations, engagement in preventive behaviors, and delay in seeking care.¹²

Diabetic patients in this study seemed to suffer from the opposite problem, an unrealistic pessimism concerning future CVD events, and this may have similar effects. This unrealistic pessimism has been documented in a few other studies among patients with diabetes^{14–16} and among ethnically diverse women.¹⁷

Our findings concur with those of Asimakopoulou et al.,¹⁴ who found that patients with type 2 diabetes were unrealistically pessimistic about their risks of coronary heart disease (CHD) and stroke. Perceived risks of CHD and stroke were higher than actual risk by factors of 3.5 and 5.5, respectively. In addition, there was a negative relationship between perception of disease risk and mood.

In a study in the Netherlands by Frijling et al.,¹⁵ patients with either hypertension or diabetes were asked to estimate their 10-year risk of developing myocardial infarction and stroke. Forty-five percent of those who were able to estimate their CVD risk overestimated this by more than 20%. Older age, smoking, family history of CVD, and actual absolute risk predicted higher levels of perceived absolute risk.

It has been proposed that people react to risk on two levels: they think about it cognitively, and they react to it emotionally.¹⁸ Risk perception is based not only on what people think about risk but also on how they feel about it.¹⁹

The prevalence of depressive symptoms (35%) was particularly high in this low-SES study population. Recent analysis of National Health Interview Survey data of 30,801 adults from the general population revealed a depression prevalence of 7.9% to 17% in patients with medical conditions.²⁰ A meta-analysis of 39 studies reported that 31% of patients with diabetes experienced significant depressive symptoms and depression was significantly higher in women than in men.²¹ Elevated depressive symptoms have been associated with decreased adherence to medications^{22–25} and three times the risk of noncompliance with medical treatment regimens.²⁶ It is unclear whether diabetic patients are more likely to develop depressive symptoms than those without diabetes or whether depressed individuals are more likely to develop diabetes than those who are not depressed. One recent analysis of data from the Multi-Ethnic Study of Atherosclerosis reported by Golden and colleagues²⁷ found both a modest association of baseline depressive symptoms with incident type 2 diabetes and 1.54 higher incidence of depressive symptoms in those in treatment for type 2 diabetes compared with those without diabetes.

This study had some limitations. Because of the cross-sectional design, we can only describe factors that are independently associated with perceived risk, not attribute cause; additionally,

the amount of variance explained (19%) was low. Participants were drawn from a single, urban clinic, for a non-random sample, potentially limiting the generalizability of the results.

Implications for future research and practice

Future research is needed to identify factors related to perceptions of CVD risk, especially in low-income diabetic patients. Additional factors to consider include other measures of social status, influence of risk information, anxiety, the influence of depression, and the temporal sequence of depression and risk perceptions. Studies also are needed to determine the best way to measure perceptions of absolute risk and relative risk. More insight is needed to determine which kinds of risk information are most effective in communicating CVD risk and which methods result in improved awareness and management of risk factors.

Health care practitioners must be aware that perceived risk may not be associated with actual risk. We should seek useful tools to explain CVD risk and effectively counsel diabetic patients. At the same time, we must screen for depressive symptoms and treat depression concurrently with other risk factors. The American Heart Association recently published a science advisory focusing on recommendations for screening, referral, and treatment of depression and coronary heart disease²⁸ which also seem applicable to our diabetic patients at very high risk for the development of CVD. These guidelines recommend a brief depression screening instrument, the Patient Health Questionnaire,²⁹ for use in practice to identify currently depressed patients. Reducing total cardiovascular risk in urban poor diabetic patients calls for a comprehensive approach, including effective communication of CVD risk and adequate identification and treatment of depressive symptoms and the traditional CVD risk factors along with management of diabetes.

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Notes

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Figure 1.
Perception of cardiac risk.

Table 1**CHARACTERISTICS OF DIABETIC STUDY POPULATION^a**

Characteristic	N=143
Mean age, years $\pm$ (SD)	52 (11)
Female (%)	71
Race/ethnicity (%)	
Black	93
White	5
Other	2
Income (%)	
Less than \$10,000/yr	30
\$10,000–\$29,999/yr	38
\$30,000–\$49,999/yr	19
Greater than \$50,000/yr	11
Refused to answer	2
Formal education (%)	
Less than high school	5
High school graduate or GED	66
Some technical, college or graduate school	29
Objective risk factors (%) ^b	
Obesity	73
Hypertension ^c	65
High cholesterol ^d	55
High HbA1c ^e	73
Current tobacco user (%)	31
Total cardiac risk factors (%)	
1 risk factor	6
2 risk factors	21
≥ 3 risk factors	73
Depressive symptoms (%) (CES-D ≥ 16)	35
Self-rated health perception, mean (SD)	66 (18)

^aDue to rounding, percents may not add up to 100.

^bObesity considered present if the BMI is ≥ 30 kg/m²

^cBlood pressure $\geq 130/80$

^dLow density lipoprotein ≥ 100

^eHigh HbA1c = hemoglobin A1c > 7

GED = general equivalency diploma

SD = standard deviation

BMI = body mass index

CES-D = Center for Epidemiologic Studies Depression Scale

Table 2

DETERMINANTS OF PERCEIVED RISK FOR HEART DISEASE

Variable	B ^a	SE ^b	p-value
Depressive symptoms	0.439	0.190	0.022
General health perception	0.282	0.127	0.028
Intake of dietary fat	0.269	0.137	0.052
Age	−0.164	0.199	0.412
Body mass index	0.169	0.259	0.516

^aParameter estimate^bStandard error