AWARENESS OF CARDIOVASCULAR DISEASE RISK IN AMERICAN INDIANS

Carrie S. Oser, MPH; Lynda L. Blades, MPH, CHES; Carol Strasheim, RN, BSN; Steven D. Helgerson, MD, MPH; Dorothy Gohdes, MD; Todd S. Harwell, MPH

Objectives: The objective of this study was to identify factors associated with perceived risk for cardiovascular disease (CVD) among older American Indians.

Design: In 2003, a telephone survey was conducted in American Indians aged ≥45 years who lived on or near the seven reservations in Montana. Respondents were asked about their history of CVD and selected risk factors and their perceived risk for CVD. The prevalence of CVD and risk factors among men and women aged ≥45 years (*N*=516) was high: CVD (26% and 15%), diabetes (24% and 26%), high blood pressure (48% and 46%), high cholesterol (34% and 40%), smoking (28% and 33%), and obesity (37% vs 46%). Men with a history of CVD (87% vs 46%), high blood pressure (70% vs 44%), high cholesterol (71% vs 53%), and obesity (67% vs 52%) were more likely to report being at risk for heart disease compared to men without these conditions. Women with a history of CVD (98% vs 58%), diabetes (74% vs 60%), high blood pressure (73% vs 56%), high cholesterol (72% vs 60%), and obesity (74% vs 55%) were more likely to report being at risk for heart disease compared to women without these conditions. Neither men nor women associated smoking with their own risk for heart disease.

Conclusions: The prevalence of CVD risk factors was high in this population, and most people recognized the risks associated with the modifiable CVD risk factors. However, neither men nor women who smoked reported being at risk for heart disease more frequently than nonsmokers. (*Ethn Dis*. 2006;16:345–350)

Key Words: Awareness, Cardiovascular Disease, Indian/North American, Perception, Risk Factors

From the Montana Cardiovascular Health Program, Montana Department of Public Health and Human Services, Helena (CSO, LLB, SDH, DG, TSH); Billings Area Indian Health Service, Billings (CS); Montana.

Address correspondence and reprint requests to Carrie S. Oser, MPH; Montana Cardiovascular Health and Diabetes Section; Montana Department of Public Health and Human Services; Cogswell Building, C-314, PO Box 202951; Helena, MT 59620-2951; 406-444-4002; 406-444-7465; coser@mt.gov

INTRODUCTION

Although cardiovascular disease (CVD) was once thought to be uncommon among American Indians in the United States, heart disease and stroke have become the first and third leading causes of death in American Indians and Alaska Natives.[1–3] In 2001, the proportion of premature heart disease deaths (deaths in persons <65 years of age) in American Indians and Alaska Natives (36%) was more than twice that reported for all races in the United States (17%).[4] Much of the increase in CVD in Indian communities has been attributed to increases in diabetes as traditional lifestyles change to sedentary and calorie-dense diets of mainstream America.[1,5] The Strong Heart Study, an epidemiologic study of CVD in American Indians aged 45–74 years in Arizona, Oklahoma, North Dakota, and South Dakota, found diabetes to be the strongest risk factor for coronary heart disease in Indians.[1] But other CVD risk factors were highly prevalent and increased over time among survivors in the initial cohort.[6–8] Strong Heart Study participants, queried during phase 1 (1989–1991) and phase 2 (1993–1995) of the study, were aware of heart disease risk factors, but participants were not asked how they perceived their own risk for developing heart disease.[9,10] Several other studies have documented the burden of CVD risk factors in American Indians,[11–14] but few focused on the awareness of individual risk.

American Indian communities in Montana are experiencing the same patterns of CVD reported in the Strong Heart Study. In 2000, CVD mortality rates were higher in Montana Indians compared with Montanans overall (404 deaths per 100,000 compared to 287 deaths per 100,000).[15] Cardiovascular disease and related risk factors were reported more frequently among Montana Indians compared to non-Indians, and Indians with diabetes were three times more likely to report a history of CVD compared to those without diabetes.[16,17] However, almost one fourth of Indian adults with diabetes who participated in a recent telephone survey did not perceive themselves to be at risk for heart disease.[17] Racial/ethnic differences regarding awareness of CVD risk have been described in women in the United States,[18,19] but little is known about the current awareness of risk for heart disease in American Indian men and women. This report describes the responses of a large sample of American Indians aged ≥45 years when asked about their risk for CVD and correlates the information with self-reported modifiable CVD risk factors.

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METHODS

In 2003, the Montana Department of Public Health and Human Services,

in collaboration with the Billings Area Indian Health Service, conducted a telephone survey (adapted from the Behavioral Risk Factor Surveillance System [BRFSS] survey) of adult American Indians living on or near Montana's seven reservations.[20] The methods used in the survey have been previously described.[16] Briefly, a sample of telephone numbers was generated by using a systematic random sampling of active three-digit telephone prefixes on or near the seven reservations in Montana. Trained interviewers made telephone calls to a random sample of households. The number of completed calls for the survey was proportional to the number of American Indian households on each reservation, according to the 2000 census. Overall, 87% of Indian households on reservations in Montana reported having telephone service in the 2000 census.[21] Most of Montana's American Indians are members of major Plains tribes including the Assiniboine, Cree, Northern Cheyenne, Crow, Gros Ventre, Blackfeet, Chippewa, and Sioux. Based on the 2000 census there were 56,038 American Indian and Alaska Natives living in Montana, most of whom were living on the seven reservations (59%).[22]

Persons aged ≥18 years who reported being American Indian were eligible to participate in the survey. The Survey System, a computer-assisted telephone interviewing software, then randomly selected the person to be interviewed from the total number of eligible American Indian adults residing in the household. A total of 4,539 calls were made as part of the survey. Of these calls, 1,458 (32%) were from nonworking numbers, 1,357 (30%) were households with no eligible respondent, 257 (6%) were not private residences, and 209 (5%) were no answer/answering machine or busy. Of the remaining calls to persons in eligible households (n=1,258), 1,000 (79%) were completions, 217 (17%) were refusals, 21 (2%) were not completed because the eligible respondents were not available during the interviewing period, and 20 (2%) were unable to complete because of communication/language barriers. The survey was field tested to detect potential problems with questions or answer categories and then revised as needed.

Respondents were asked about CVD and modifiable risk factors for CVD. Respondents who reported a history of acute myocardial infarction or heart attack, angina, coronary artery disease, or stroke were categorized as having CVD. Respondents were also asked if a physician had ever told them they had diabetes, high blood pressure, or high cholesterol. Female respondents who only had been told they had gestational diabetes were not categorized as persons with a current diagnosis of diabetes. Respondents who reported that they smoked cigarettes every day or some days were categorized as current smokers. Self-reported height and weight were used to calculate a body mass index (BMI, kg/m^2), and a value of ≥30.0 was defined as obese. Respondents were also asked the following question to assess their individual awareness of risk for heart disease: "Do you think you are at risk for heart disease?" The response categories for this question included yes, no, do not know, and refuse to answer.

Data analyses were completed by using SPSS v.11.5 software (SPSS Inc., Chicago, Ill) and included only respondents aged ≥45 years (516 of 1,000, 52%). Chi-square tests were used to compare differences in awareness of heart disease risk in men and women with and without CVD and modifiable risk factors for CVD. Multiple logistic regression analyses were conducted to adjust for age, marital status, years of education, and household income.

RESULTS

Of the 516 respondents aged ≥45 years, 310 (60%) were women and 206 (40%) were men. American Indian men were more likely to be married or living with a partner and have a higher household income than women (Table 1). No differences were seen between men and women by age or level of education. Men were more likely to report a history of CVD compared to women (26% vs 15%). The prevalence of modifiable risk factors for CVD was high in both men and women.

Overall, 61% of respondents reported that they were at risk for heart disease. No significant difference was seen in awareness between men or women (57% vs 64%, P=.12). This finding remained after adjusting for age, marital status, level of education, and household income (odds ratio .70, 95% confidence interval .48–1.03). Men and women with multiple risk factors were more likely to perceive that they were at risk compared to those with fewer modifiable risk factors (Figure).

Among Indian men, no differences were found in awareness of risk for heart disease in those aged ≥65 years compared to those aged 45–64 years (59% vs 56%, P=.70). Indian men who reported CVD, high blood pressure, high cholesterol, or obesity were more likely to report being at risk for heart disease compared to Indian men not reporting these conditions (Table 2). These differences remained after adjusting for other demographic characteristics. No significant differences were found in awareness of risk for heart disease between men with and without diabetes and men who currently smoked versus those who did not smoke.

Younger Indian women, aged 45–64 years, were more likely than older women to report being at risk for heart disease (68% vs 52%, P=.008). Indian women who reported CVD, diabetes, high blood pressure, high cholesterol, or obesity were more likely to be aware of their risk for heart disease compared to women not reporting these conditions (Table 2). These differences remained

Table 1. Characteristics of American Indian respondents aged ≥45 years, Montana, 2003

	Men (*N*=206)	Women (*N*=310)
	Mean (SD)	Mean (SD)
Age (years)	57.4 (9.0)	58.7 (10.0)
	% (*n*)	% (*n*)
Marital status		
Married or cohabitating	73 (148)*	49 (149)
Single, never married	4 (9)	7 (22)
Separated, divorced, or widowed	23 (47)	44 (135)
Education		
<12 years	17 (34)	16 (49)
≥12 years	83 (171)	84 (259)
Household income		
<$20,000	29 (60)	38 (119)*
≥$20,000	61 (125)	46 (141)
Unknown	10 (21)	16 (50)
History of cardiovascular disease (CVD) and related-risk factors		
CVD†	26 (53)*	15 (45)
Diabetes	24 (49)	26 (81)
High blood pressure	48 (98)	46 (142)
High cholesterol	34 (61)	40 (108)
Smoking	28 (58)	33 (101)
Obese‡	37 (76)	46 (132)

* $P \leq .05$.

† Cardiovascular disease includes a history of acute myocardial infarction, angina, coronary artery disease, or stroke.

‡ Obese is defined as a body mass index ≥30.0 kg/m^2.

after adjusting for other demographic characteristics. No significant differences were seen in awareness of risk for heart disease between women who currently smoked versus those who did not smoke.

DISCUSSION

This study of a representative sample of older American Indian men and women living on or near the reservations in Montana suggests that many individuals have multiple modifiable risk factors for CVD and that most men and women were aware of their own potential risk for developing heart disease. However, approximately one third of respondents with two or more risk factors did not report themselves to be at risk for developing heart disease. Remarkably, Indian men and women who smoked currently reported that they were at risk for heart disease no more frequently than nonsmokers.

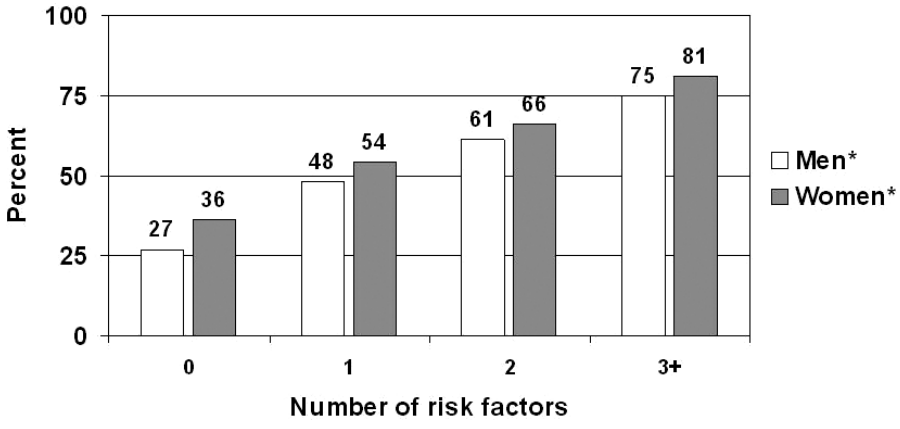

Figure. Awareness of risk for heart disease in adult American Indians aged ≥45 years by the number of self-reported modifiable risk factors for heart disease, Montana, 2003. Risk factors include diabetes, high blood pressure, high cholesterol, smoking, and obesity. * $P<.001$.

Remarkably, Indian men and women who smoked currently reported that they were at risk for heart disease no more frequently than nonsmokers.

The high prevalence of CVD risk factors among American Indian men and women living on the reservations in Montana is similar to findings from pooled responses to the Behavioral Risk Factor Surveillance System among American Indian adults from the Northern Plains between 1997 and 2000.[13] Indian men and women in that study reported a high prevalence of obesity, diabetes, and smoking (obesity: 23% and 26%, diabetes: 10% and 14%, and smoking: 48% and 40%, respectively). General awareness of CVD risk factors has been described in other Indian communities. Overall awareness of specific heart disease risk factors was high among Strong Heart Study participants in 1993–1995, particularly in those with a history of CVD, hypertension, and diabetes compared to those without these conditions.[10] However, smokers in the Strong Heart Study had less knowledge of risk factors for heart disease than nonsmokers. Similarly, awareness of CVD risk factors, including smoking, was high in American Indians aged ≥25 years in Minnesota who participated in the Inter-Tribal

Table 2. Awareness of risk for heart disease in adult American Indian respondents aged ≥45 years, by sex, Montana, 2003

	Aware of Heart Disease Risk			
Risk Characteristics Reported	Men		Women	
	% (*n*/*N*)	Adjusted OR (95% CI)*	% (*n*/*N*)	Adjusted OR (95% CI)*
CVD†				
Yes	87 (46/53)‡	10.01 (1.36–26.06)	98 (44/45)‡	§
No	46 (71/153)	—	58 (153/264)	—
Diabetes				
Yes	63 (31/49)	1.53 (.75–3.10)	74 (60/81)‡	2.14 (1.18–3.40)
No	55 (85/155)	—	60 (137/229)	—
High blood pressure				
Yes	70 (69/98)‡	2.86 (1.59–5.13)	73 (104/142)‡	3.31 (1.89–5.79)
No	44 (48/108)	—	56 (93/167)	—
High cholesterol				
Yes	71 (43/61)‡	2.33 (1.17–4.63)	72 (78/108)‡	1.99 (1.14–3.47)
No	53 (62/118)	—	60 (98/163)	—
Smoking				
Yes	57 (33/58)	.99 (.52–1.89)	64 (65/101)	1.00 (.59–1.69)
No	57 (84/148)	—	63 (131/207)	—
Obese‖				
Yes	67 (51/76)‡	1.98 (1.08–3.63)	74 (98/132)‡	2.44 (1.43–4.15)
No	52 (66/128)	—	55 (87/158)	—

* Odds ratio (OR) adjusting for age, marital status, years of education, and household income. CI=confidence interval.
† Cardiovascular disease (CVD) includes a history of acute myocardial infarction, angina, coronary artery disease, or stroke.
‡ $P \leq .05$.
§ Too few data points to calculate the adjusted odds ratio.
‖ Obese is defined as a body mass index ≥30.0 kg/m^2.

Heart Project in 1996.[11] Because our findings are consistent with those reported in the Strong Heart Study and Inter-Tribal Heart Project participants, reported awareness of heart disease risk in Indians in Montana likely represents the awareness among many tribes.

The lack of recognition of smoking as a heart disease risk factor in men and women in this study is troubling for several reasons. Smoking is highly prevalent not only in Plains Indians in the United States but also among many aboriginal groups in Canada, who are also experiencing a marked increase in cardiovascular illness.[23,24] Possibly the traditional use of tobacco may impede the recognition and acceptance of cigarette smoking as a risk factor, but accurate recognition of smoking as a risk factor will be crucial in decreasing modifiable risks for CVD among native peoples throughout North America.[1,25] Secondly, the contribution of smoking as a risk factor in Plains Indians may be seriously underestimated. In the Strong Heart Study, CVD incidence and mortality in the tribes from the Dakota's was markedly higher than the rates found in the southern Arizona.[26] In the well-studied Pima Indians of southern Arizona included in the Strong Heart Study cohort, CVD events have occurred almost exclusively in individuals with diabetes.[27] The increase in heart disease mortality has recently been attributed to the implementation of renal replacement therapy for this population.[28] The cardiovascular risk profile of the Pima Indian population in Arizona has been well documented both in the Strong Heart Study and in the ongoing Pima Indian studies conducted by the National Institutes of Health. Although the rates of diabetes are among the highest ever documented, smoking rates are very low and lipid profiles in the population are favorable.[7,8,27,29] Tribes in the Northern Plains, however, have higher CVD mortality rates, and the variation in mortality between tribes in the United States is likely due to differences in the prevalence of CVD risk factors, including smoking.[6,8,26]

This study has a number of limitations. First, the survey only included Indians age ≥45 years who lived on or near a reservation whose households had telephones. Because a previous study among American Indians found that adults living in households without telephones had a higher prevalence of risk behaviors compared to persons living in households with telephones, our finding may underestimate the prevalence of CVD risk factors.[30] Telephone coverage for households on Montana reservations is relatively high (87%) when compared to the coverage reported in the 2000 census for all reservations in the United States (68%).[21] Secondly, self-reported information regarding CVD and CVD risk factors is subject to recall bias. A self-reported history of high cholesterol may have been influenced by how aggressively the primary care systems pursued lipid screening. Although studies have found that self-

reported CVD risk factors are reported reliably, the studies did not include American Indians.[31,32]

In summary, this is one of few reports about the awareness of heart disease risk in a large sample of American Indians ascertained in a community setting. CVD risk factors were highly prevalent, and many individuals perceived the risks accurately. However, others, particularly smokers, were not aware of their own risk for CVD compared to nonsmokers, and men with a history of CVD were less likely than women to perceive their risk for future events. Cardiovascular risk reduction strategies in Indian communities must include reducing the risks among those with diabetes, but attention should also be focused on decreasing modifiable risk factors, including smoking, regardless of whether or not an individual has diabetes. The findings in this report underscore the need for a better understanding of the risk factors and awareness of heart disease risk in many Indian communities.

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AUTHOR CONTRIBUTIONS

Design concept of study: Blades, Helgerson, Gohdes, Harwell
Acquisition of data: Oser, Strasheim, Harwell
Data analysis interpretation: Oser, Helgerson, Harwell
Manuscript draft: Oser, Blades, Strasheim, Helgerson, Gohdes, Harwell
Statistical expertise: Oser, Helgerson, Dorothy Harwell
Acquisition of funding: Blades, Harwell
Administrative, technical, or material assistance: Oser, Strasheim, Gohdes
Supervision: Blades, Harwell