Barbara V. Howard, PhD
for the Strong Heart Study
Investigators

Dr. Howard is with the Medlantic
Research Institute in Washington,
DC.

Blood Pressure in 13 American Indian Communities: The Strong Heart Study

SYNOPSIS

Using National Heart, Lung, and Blood Institute (NHLBI) protocols, researchers measured blood pressure in 4549 American Indians ages 45 to 74 from 13 communities. The prevalence of hypertension ranged from 27% to 56%. More than 70% were aware of the diagnosis, more than 50% were receiving treatment, and 30% controlled their hypertension with medication. Blood pressure was significantly related to glucose intolerance, age, obesity, and alcohol consumption. There was little relation between blood pressure and plasma insulin.

The Strong Heart Study is a longitudinal study of cardiovascular disease and its risk factors in American Indians from 13 tribes in Arizona, Oklahoma, and South and North Dakota. This report presents prevalence data on blood pressure and the presence of hypertension and relates these to other risk factors.

Methods

The Phase I examination, which took place between July 1989 and January 1992, examined 4549 men and women between the ages of 45 and 79 (1). Tribes in Arizona included the Gila River and Salt River Pima-Maricopa and the Ak Chin Pima-Papago. Tribes in Oklahoma included Apache, Caddo, Comanche, Delaware, Fort Sill Apache, Kiowa, and Wichita. Tribes in the Dakotas included the Oglala, Cheyenne River, and Devil's Lake Sioux.

Using NHLBI protocols, we measured sitting blood pressure (2), after a 5-minute rest and used the average of the last two of three measures (3). Hypertension was defined, according to the protocols in *The Fifth Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure* (JNC-V) (2), as systolic blood pressure ≥140 mmHg, diastolic blood pressure ≥90 mmHg, or current use of antihypertensive medication. We diagnosed diabetes with a 75-gram oral glucose tolerance test using World Health Organization (WHO) criteria (4). We assessed obesity by measuring body fat using bioelectric impedance; insulin by radioimmunoassay (5); and alcohol consumption, diet, and physical activity by standard questionnaires.

Tearsheet requests to Dr. Barbara V.
Howard, Medlantic Research Institute, 108
Irving Street, NW, Washington, DC 20010-
2933; tel. 202-877-6530; fax 202-877-3209.

Table 1. Prevalence of hypertension by gender and age

Age	Women		Men	
	Prevalence	95% CI	Prevalence	95% CI
All ages	37.7	35.8–39.5	39.1	36.9–41.3
45–54	27.6	25.2–30.1	34.7	31.7–37.7
55–64	41.5	38.4–44.7	40.9	36.8–44.9
65–74	56.2	51.9–60.6	49.2	43.6–54.8

Table 2. Hypertension awareness, treatment, and control (%) by gender and age

Age	Women			Men		
	Aware	Treated	Controlled	Aware	Treated	Controlled
45–54	82.2	62.9	36.3	75.6	53.0	31.3
55–64	79.9	65.5	31.6	68.9	51.5	26.0
65–74	69.2	50.5	26.5	70.0	54.7	28.7

Results

Prevalence of hypertension ranged from more than 27% in participants ages 45 to 54 to 56% in participants ages 65 to 74 (Table 1). Prevalence of diabetes was high (65% to 71% in the Arizona population and 32% to 41% in the Oklahoma and Dakotas populations). Prevalence of hypertension was lowest in those with normal glucose tolerance, higher in those with impaired glucose tolerance (1.41x), and highest in those with diabetes (1.78x). Between 70% and 80% of those with hypertension in all age and gender groups were aware of their diagnosis, and more than 50% were taking blood pressure medications (Table 2). The proportion of those whose medication controlled their hypertension (achieving a systolic blood pressure <140 mmHg and a diastolic blood pressure <90 mmHg) averaged 30%, with greater control in the younger decades. There was little severe hypertension: Most participants had Stage 1 hypertension, less than 1% had Stage 4, and an average of 1% to 4% had Stage 3 in the three decades (stages were defined according to JNC-V *(1)*). Blood pressure levels were significantly related to age in men and women with and without diabetes, but only weakly related to obesity. After adjusting for other covariates, blood pressure was not related to plasma insulin, except for systolic blood pressure in women. Blood pressure was higher in those reporting alcohol consumption, especially binge drinking. Systolic blood pressure levels were negatively related to level of education, and positively related to percentage of American Indian blood. In a subset of participants for whom diet data were available, blood pressure was related to dietary calcium.

Conclusions

Despite the high prevalence of diabetes and obesity, blood pressure levels are relatively low in these American Indian communities. Hypertension is mild, and much of it is diagnosed and controlled. Age and diabetes are significantly associated with hypertension, but obesity and hyperinsulinemia are not. Blood pressure appears to increase with alcohol consumption. Education programs on blood pressure and its control by lifestyle modification may be particularly beneficial in American Indian communities.

References

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