

Diabetes and Its Complications Among Selected Tribes in North Dakota, South Dakota, and Nebraska

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OBJECTIVE— To determine the prevalence and incidence rates of diabetes and two specific complications for selected American-Indian tribes in North Dakota, South Dakota, and Nebraska.

RESEARCH DESIGN AND METHODS— A descriptive epidemiological study was conducted using ambulatory care data during 1987 for prevalence and diabetes registries and complication case reporting during 1988 from IHS facilities on reservations in these states.

RESULTS— The Winnebago and Omaha tribes had the highest age-adjusted diabetes rates, with prevalence 8.8 times and incidence 7.7 times the respective U.S. rates. The diabetes prevalence rate of combined data for the Sioux was 3.7 times the U.S. rate. Among Sioux Indians, the age-adjusted incidence rate for ESRD was 4.8 times the American-Indian/Alaska-Native rate and 13.4 times the rate for U.S. whites. The proportion of new diabetes-related ESRD (86%) was almost 3 times greater than the general U.S. population rate (30%). Also, among the Sioux, the age-adjusted incidence rate for LEA (86.7/10,000 diabetic population) was 1.5 times higher than the U.S. rate; the proportion of diabetes-related LEA (84%) was 1.8 times higher than the general U.S. population rate (45%).

CONCLUSIONS— The age-adjusted rates of diabetes and certain complications among these Northern Plains tribes are greater than the U.S. rates. Improved health

services to detect and monitor diabetes and its complications and community-based prevention activities directed at the epidemic of diabetes among the various Indian tribes are urgently needed.

Over the past 50 yr, type II diabetes has reached epidemic proportions among American Indians (1). The Pima Indians in Arizona have long been recognized as having the world's highest reported incidence and prevalence of diabetes (2). Diabetes rates among other American-Indian tribes also have been reported to be higher than in the general U.S. population (3; this issue, Valway et al., p. 271–76). This report discusses the incidence and prevalence of diabetes and two specific complications among American Indians residing in North Dakota, South Dakota, and Nebraska. Although these tribes are predominately Northern Plains Indians from the Sioux nation, the Winnebago tribe in Nebraska combines the cultural heritage of Plains and Eastern Woodlands tribes, such as the Chipewewa (4). Table 1 lists the principal tribe(s) for each reservation included in this analysis.

RESEARCH DESIGN AND METHODS

Ambulatory care data from outpatient visits to IHS facilities on the reservations during 1987 were used to determine the prevalence of diabetes on each reservation according to the method described elsewhere in this issue (Valway et al., p. 271–76). Diabetes model projects at Fort Totten in North Dakota (Devil's Lake Sioux) and at Winnebago/Omaha in Nebraska maintained diabetes registries that provided incidence rates as part of their ongoing activities. IHS providers used a modified oral glucose tolerance test as described in studies among the Pima Indians to diagnose diabetes according to WHO criteria (6). Cases of ESRD and LEA were identified through hospital records and provider reports, and each record was reviewed to verify the information.

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IHS, INDIAN HEALTH SERVICE; ESRD, END-STAGE RENAL DISEASE; LEA, LOWER-EXTREMITY AMPUTATION; TYPE II DIABETES, NON-INSULIN-DEPENDENT DIABETES MELLITUS; WHO, WORLD HEALTH ORGANIZATION.

Table 1—Age-adjusted prevalence and incidence rates of diabetes among selected tribes in the U.S. Northern Plains

RESERVATION	PRINCIPAL TRIBE(S)	TOTAL POPULATION	PREVALENCE RATE, 1987	RISK RATIO	INCIDENCE RATE, 1988
CHEYENNE RIVER	SHOUX	5634	105.8	4.3	—
CROW CREEK/LOWER BRULE	SHOUX	4138	83.2	3.4	—
FORT TOTTEN (DEVIL'S LAKE)	SHOUX	3427	111.4	4.5	8.4
PINE RIDGE (OGLALA)	SHOUX	17,128	69.8	2.8	—
ROSEBUD	SHOUX	9062	81.5	3.3	—
SISSETON/WAHPETON	SHOUX	4502	63.9	2.6	—
TURTLE MOUNTAIN	CHIPPEWA	9617	104.5	4.2	—
STANDING ROCK	SHOUX	6600	125.4	5.1	—
YANKTON/SANTEE	SHOUX	2791	196.4	8.0	—
WINNEBAGO/OMAHA	WINNEBAGO AND OMAHA	4688	218.1	8.8	20.0
AMERICAN INDIANS/ALASKA NATIVES*		870,095	69.0	2.8	—
U.S.		—	24.7†	1.0	2.7‡

Rates per 1000 population.

*This issue, Valway et al.

†Drury and Powell (8).

‡Carter Center of Emory University (9).

Populations for each reservation were estimated by the IHS (6) from 1980 U.S. census data (7). Diabetes prevalence rates for 1987 and ESRD rates for 1988 were determined by using the 1987 and 1988 populations, respectively. To determine LEA rates for diabetic individuals in 1988, the prevalence of diabetes in 1987 was applied to the 1988 population to estimate the number of individuals with diabetes in 1988. This estimated number was used when computing LEA rates among diabetic individuals. The diabetes prevalence and ESRD rates were age adjusted by the direct method to the 1980 U.S. population (7). The LEA rate was age adjusted to the 1980 U.S. population known to have diabetes (8).

RESULTS

Diabetes

Prevalence and incidence of diagnosed diabetes is shown in Table 1. The age-adjusted prevalence and incidence rates of diabetes among these Northern Plains tribes were all greater than the U.S. rates. The Winnebago and Omaha tribes had the highest prevalence and incidence of

those studied, with a rate 8.8 and 7.7 times the respective U.S. prevalence and incidence rates (8). The diabetes age-adjusted prevalence rates among the Winnebago and Omaha tribes were also 3.2 times the overall American-Indian rate (this issue, Valway et al., p. 271–76). The diabetes age-adjusted incidence rate among the Devil's Lake Sioux at Fort Totten was 3.2 times the U.S. rate (9). Combining data from the Sioux reservations yielded an age-adjusted prevalence of diabetes of 92.4/1000, which is 3.7 times the U.S. rate (8). Considerable variation was observed among various Sioux reservations, with the Yankton/

Santee Sioux having the highest rate (8 times the U.S. rate) and the Sisseton/Wahpeton Sioux the lowest rate (2.6 times the U.S. rate) (8).

ESRD

At the end of 1988, 98 known cases of ESRD were noted (80 dialysis, 18 renal transplants) among the Sioux; 76% of the cases occurred in diabetic patients (Table 2). The age-adjusted prevalence of ESRD was 1646/1,000,000, 3.5 times the white rate of 470/1,000,000 in 1987 (10). There were 43 incident cases of ESRD in 1988, of whom 37 (86%) had diabetes. This incidence is 2.9 times

Table 2—Proportion of prevalent and incident ESRD cases attributed to diabetes

POPULATION*	YEAR STUDIED	PREVALENCE (%) WITH DIABETES)	INCIDENCE (%) WITH DIABETES)
U.S. (10)	1987	21	30
WHITE (10)	1987	21	30
NAVAJO (12)	1985	40	50
SHOUX	1988	76	86
PIMA (14)	1975–1986	—	95
AMERICAN INDIANS/ALASKA NATIVES (11)	1983–1986	—	56

*Numbers in parentheses are references.

Table 3—Incidence rate and risk ratio of Indian ESRD rates compared with white rates

STUDY POPULATION*	CRUDE RATE	RISK RATIO	AGE-ADJUSTED RATE	RISK RATIO
SIoux (1988)	722	7.6	1278	13.5
NATIVE AMERICAN (1983–1986) (11)	168	1.8	269	2.8
NAVAJO (1981–1985) (12)	179	1.9	—	—
ZUNI (1973–1983) (13)	—	—	722	7.6
PIMA (1975–1986) (14)	—	—	1860	19.6
WHITE (1983–1986) (11)	95	1.0	95	1.0

Rates per 1,000,000.

*Numbers in final parentheses are references.

greater than the 30% diabetes-related ESRD occurring in the general U.S. population in 1987 (10). The crude incidence rate of ESRD among the Sioux was 722/1,000,000, and the age-adjusted incidence rate was 1278/1,000,000, both higher than comparable rates from recent years for all Indians (11), Navajo (12), Zuni (13), and whites (11; Table 3). However, the Sioux incidence rate was significantly lower than rates reported among the Pima Indians in Arizona (14).

LEA

Of the 31 LEAs performed on Sioux Indians during 1988, 26 (84%) occurred in diabetic patients. All amputations occurred in patients >40 yr of age, and 45% of the procedures were below-knee amputations. The age-adjusted rate for amputations was 86.7/10,000 diabetic individuals—a rate 1.5 times higher than the 1978 U.S. rate of 59.7/10,000 diabetic individuals (15). The Sioux LEA rate was significantly lower than the Pima Indian rate (86.7 vs. 241/10,000) (16).

CONCLUSIONS—Diabetes rates are high among Indians in North Dakota, South Dakota, and Nebraska. The Sioux residing in these states comprise one of the largest tribes in the U.S., even though they are scattered over several reservations. Relatively few reports of diabetes have been made among Northern Plains Indians, but the high rates of diabetes

and its complications in the Winnebago/Omaha Indians and Crow Creek/Lower Brule Sioux have been documented previously (17,18). The proportion of diabetes-related ESRD and LEA in the Sioux is much larger than in the white population and is nearly as high as the proportion among the Pima Indians (14,16). The data from this study confirm the widespread occurrence of diabetes among Plains Indians and among the Sioux in particular. Our study strongly suggests that improved health services to screen and monitor for diabetes and its complications among Northern Plains Indians are critical. Also, community-based prevention activities directed toward diabetes—that are culturally sensitive and emphasize traditional values to promote weight loss through diet and exercise—are urgently needed in these American-Indian communities.

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