Health Canada Santé Canada

ABORIGINAL DIABETES INITIATIVE

Diabetes Among Aboriginal (First Nations, Inuit and Métis) People in Canada:

THE EVIDENCE

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Canada

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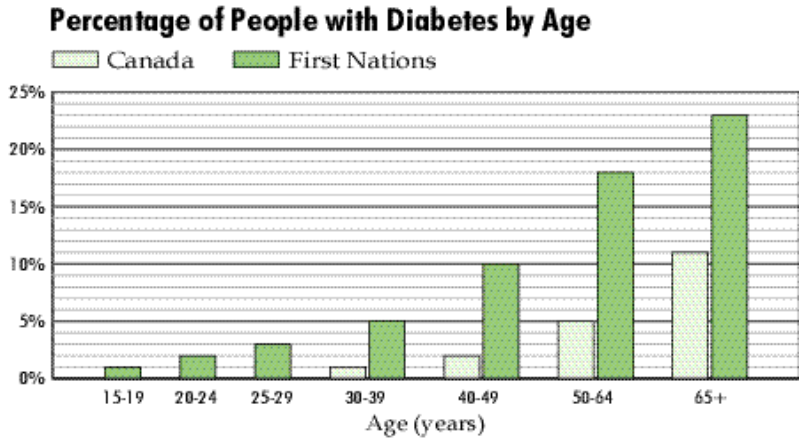
EXECUTIVE SUMMARY

From a disease that was virtually unknown among First Nations, Inuit and Métis people fifty years ago, the prevalence of diabetes among First Nations is now at least three times the national average, with high rates occurring in all age groups (Figure 1). Diabetes in First Nations communities is now considered an

FIGURE 1



Based on data from the Aboriginal Peoples Survey (1991) and National Population Health Survey (1994)

Source: Bobet, 1997

epidemic, and rates are continuing to increase. Rates of diabetes appear to be higher on-reserve than off-reserve. Although much less is known about diabetes among Métis people, results from the Aboriginal Peoples Survey show rates well above the non-Aboriginal average. In the past, Inuit people have been the only exception to this pattern of high rates. However, more recent regional data indicate that this too is changing. Data available for some First Nations indicate a high prevalence of complications such as heart disease, hypertension, stroke, lower limb amputations, kidney disease, and eye disease. There is particular concern regarding two groups within the First Nations population: children and women of childbearing age.

Rates of diabetes appear to be higher on-reserve than off-reserve.

Most of the available information on diabetes among Aboriginal people concerns First Nations communities. However, based on the limited data available, there is still cause for concern among Métis and Inuit people. Métis people have diabetes prevalence rates higher than that reported among First Nations living off-reserve (Statistics Canada, 1991) and report less access to primary health services compared to the general population. Risk factors such as obesity and physical inactivity are increasing among some Inuit communities (Young et al., 1993; Imrie and Warren, 1988), and the prevalence of diabetes among the Labrador Inuit is greater than that of the non-Aboriginal population (Labrador Inuit Health Commission, 1999). Issues of access to health care services are key issues where Inuit experience the lowest access to physician and health professional services (Statistics Canada, 1993; Newbold, 1998).

Based on the limited data available, there is still cause for concern among Métis and Inuit people.

Diabetes is an important issue in the Aboriginal population for a variety of reasons other than high rates of disease. Other concerns include early onset, greater severity at diagnosis, high rates of complications, lack of accessible services, increasing trends, and increasing prevalence of risk factors for a population already at risk. Because Aboriginal ancestry is a risk factor for diabetes (Young et al., 1990), this disease is of importance to all Aboriginal communities.

INTRODUCTION

Diabetes Mellitus is an endocrine disease resulting from a deficiency of insulin, characterized by hyperglycemia and possible long-term complications. Although many etiologic classifications exist for diabetes, the two most common are referred to as "type 1" and "type 2." Type 1 diabetes is caused by autoimmune or idiopathic destruction of pancreatic beta cells, usually leading to an absolute deficiency of insulin. Patients with type 1 diabetes are prone to ketoacidosis, and must undergo insulin therapy to sustain life. Type 2 diabetes can result from insulin resistance in the body's tissues and/or a secretory defect in the pancreas. A third common form of the disease is gestational diabetes, which occurs in 2% to 4% of all pregnancies (Canadian Diabetes Association, Canadian Medical Association, 1998).

Generally, approximately 90% of people with diabetes have type 2, while roughly 10% have type 1 (Centers for Disease Control and Prevention, 1997). Type 1 diabetes is rare among Aboriginal people, meaning the majority of diabetes cases in First Nations communities are due to type 2 (Canadian Paediatric Society, 1994). Although type 2 diabetes usually occurs later in life than type 1 diabetes, the prevalence of type 2 diabetes among Aboriginal children in Canada is increasing (Dean et al., 1992; 1998; Harris et al., 1996).

Approximately 90% of people with diabetes have type 2.

When looking at diabetes in the Aboriginal population it is important to distinguish between the different peoples that are included in this definition. When health data or results of research are reported, the information will be specific to the population included in the study. These populations will include First Nations, Métis and/or Inuit peoples. The term Aboriginal will be used to be inclusive of all three peoples. Health information dealing with First Nations communities may also be reported as "on-reserve" or "off-reserve" figures.

Because Aboriginal ancestry is a risk factor for diabetes (Young et al., 1990), this disease is of importance to all Aboriginal communities, regardless of whether or not a community currently experiences a high rate of disease. Due to the nomadic lifestyles and feast/famine cycles of their ancestors, Aboriginal peoples in Canada are likely to be genetically predisposed to store energy from the diet very efficiently. The adoption of a market diet high in energy, saturated fat and simple sugars, along with an increased tendency towards sedentary lifestyles and reduced physical activity, leads to a rise in the prevalence of obesity and subsequently diabetes (Thouez et al., 1989). The theory that a "thrifty" genotype combined with changing environmental factors could be responsible for increasing diabetes rates has been present for many years (Neel, 1962; Daneman, 1993).

Diabetes is a significant concern in Aboriginal communities for a variety of reasons other than high rates of disease.

Diabetes is a significant concern in Aboriginal communities for a variety of reasons other than high rates of disease, including earlier onset, greater severity at diagnosis, high rates of complications, lack of accessible services, increasing trends, and the increased prevalence of risk factors for a population already at risk. It is also important to note that diabetes rates among Aboriginal peoples in Canada vary markedly according to geographical area and ethnic group. This should be considered in the development of future public health policies and interventions to reduce the burden of diabetes.

It is important to acknowledge the work that was done by the Aboriginal Diabetes Strategy working groups in the completion of a draft Background Paper for the Development of an Aboriginal Diabetes Strategy: Report of the Working Group, June 1998, and input received by members of the Aboriginal Diabetes Initiative Steering Committee. There was also earlier work done by the First Nations communities, the National Aboriginal Diabetes Association, the Canadian Diabetes Association and community researchers.

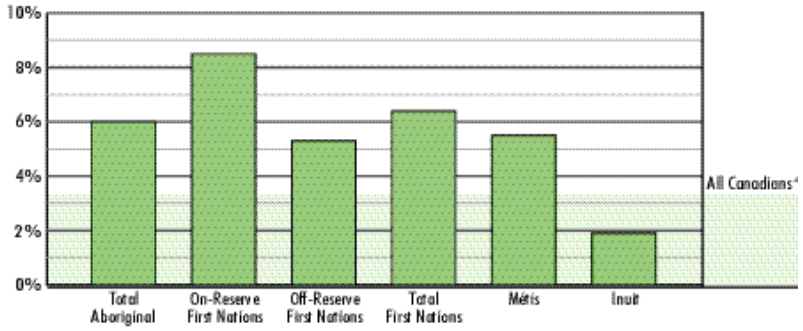
DIABETES AMONG ABORIGINAL PEOPLE

The total number of Aboriginal people with diabetes is unknown but can be inferred based on self reported national survey data and population numbers from the 1991 Aboriginal Peoples Survey (APS) (Statistics Canada, 1991; Statistics Canada, 1993). Of the total Aboriginal population represented in this survey, approximately 783,980 identified as North American Indian, 212,650 as Métis and 49,255 as Inuit. The reported prevalence rates of diabetes have been applied to population groups starting at age 15, along with some assumptions regarding what is known about underestimation. It is assumed that the actual number is probably 2 to 3 times greater due to the high proportion of Aboriginal people left undiagnosed (Young et.al, 1992; Young, 1994). The assumption of undercounting is higher than that assumed for the general population and this is likely due to the linguistic, cultural and physical barriers to accessing health services where a diagnosis would be made. Using this methodology, it is estimated that in 1991, from 80,000 to 120,000 Aboriginal people 15 years of age and over had diabetes in Canada. This is still likely to be an underestimate, as we know that both the rates of diabetes and the number of Aboriginal people has increased since 1991. However, more recent data are not available for the total Aboriginal population. The prevalence rates from the First Nations and Inuit Regional Health Survey are 20% greater than the APS (First Nations and Inuit Regional Health Survey National Steering Committee, 1999).

It is assumed that the actual number is probably 2 to 3 times greater.

FIGURE 2

Crude Prevalence of Self-Reported Diabetes from the Aboriginal Peoples Survey, 1991



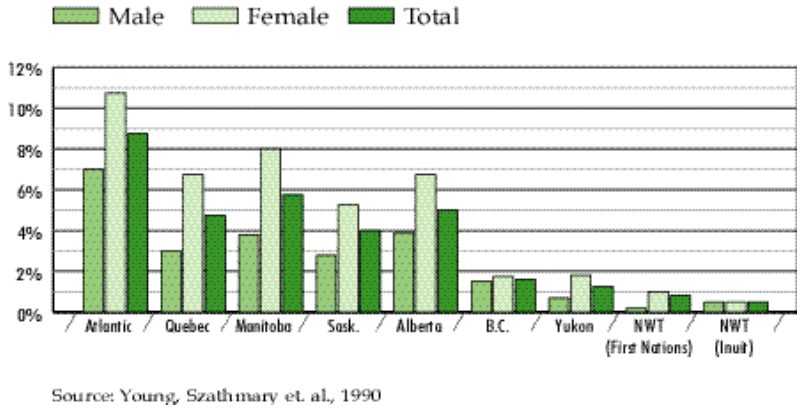
Note: Based on Statistics Canada (1993) report.
* National Population Health Survey 1994, excludes First Nations on-reserve, remote Ontario and Quebec, and the Territories (First Nations and Inuit)

Higher rates in the south are attributed to greater intensity of exposure to non-Aboriginal influence.

The most recent data available which includes all Aboriginal people across Canada, is the somewhat dated Aboriginal Peoples Survey of 1991. Figure 2 shows the crude prevalence rates of diabetes calculated from the survey, illustrating the highest rates among First Nations people at 6.4%, and a higher rate for those living on-reserve (8.5%) than off-reserve (5.3%). Métis people reported a prevalence of 5.5%, still considerably above the national average for the total population for the same time period (3.1%). Inuit people are the only exception to the pattern; at present, their rates are below the national average at 1.9% according to this 1991 survey (MacMillan, 1996). Controlling for different age demographics in the Aboriginal and general population further accentuates the high rates for First Nations and Métis people, due to the predominantly young Aboriginal population.

FIGURE 3

Age-Adjusted Prevelence of Diagnosed Diabetes by Administrative Region (MSB) for Registered Indian and Inuit by Sex, 1990, Canada



Source: Young, Szathmary et. al., 1990

According to the 1991 Aboriginal Peoples Survey, the provincial rates for First Nations[1] were lowest in BC and the northern territories, and highest in the Ontario-Manitoba-Saskatchewan area (Bobet, 1997). Figure 3 shows the results of an earlier study (Young et al., 1990), which included First Nations and Inuit people using

1. Sample sizes for Métis and Inuit were not sufficiently large to perform analyses by region.

Medical Services Branch (MSB) chronic register data. Here an east to west gradient can be seen, with the highest diabetes rates appearing in the west. It should be mentioned that comparing east to west is misleading, because of the striking difference between regional prevalence rates in the west. The survey results also indicate a trend of increasing rates from north to south. These higher rates in the south are attributed to greater intensity of exposure to non-Aboriginal influence, and subsequent loss of traditional diets and lifestyles (Daniel and Gamble, 1995). This explanation has been further supported by the stability of the pattern within language groups; for example, diabetes prevalence was 0.6% for Subarctic Athapaskans versus 3.4% among plains Athapaskans. In the North, a predominant east to west gradient appears where First Nations and Inuit people experience greater rates of diabetes in the West (which has greater exposure to Western culture) compared to the East.

Studies in the Canadian arctic conclude that the true prevalence may be two or three times the rate of known diagnosed cases.

Inuit People

According to the overall national estimates of the 1991 APS, Inuit people have a lower rate of diabetes (1.9%) compared to the Canadian population (MacMillan, 1996). However, a more recent regional study indicates otherwise. Data from the First Nations and Inuit Regional Health Survey (1999) show diabetes rates as high as 4% among Inuit people in Labrador (Labrador Inuit Health Commission, 1999), which is higher than estimates for the Canadian population. Circumpolar studies in the Canadian arctic conclude that the true prevalence may be two or three times the rate of known diagnosed cases (Young et.al, 1992).

An eight-year study of diabetes among Alaskan natives found the greatest increase occurring among the Eskimos (Schraer et al., 1997). A 1984 study by Ekoe et al (1990) of the Inuit and Cree Indian people of northern Quebec found 45% of Inuit people sampled (using a venous blood sample) had “probable abnormalities of glucose tolerance.” While only 2 out of the 503 Inuit participants were identified as “likely diabetic,” there was a significant association between increasing Body

Mass Index, age and blood glucose levels among Inuit females. Among Inuit males, the higher mean plasma glucose levels were significantly associated with higher systolic blood pressure.

It is important to remember that the true extent of the problem is not yet known.

Increasing prevalence of risk factors such as obesity has been documented in some Inuit Regions. For example, the First Nations and Inuit Regional Health Survey indicated that 36% of women and 26% of men from Labrador were found to be overweight. Although a recent study showed the prevalence of diabetes among Inuit in Keewatin District, Northwest Territories is low, the study also found that 31% of adults were considered overweight (body mass index > 27) (Orr et al., 1998). In the Baffin region, a study by Rode and Shephard (1994) found that the fitness of the community appeared to have deteriorated markedly. While the currently known prevalence rates may be low, an early response to preventing these increasing trends is called for (Inuit Tapirisat of Canada, 1999).

According to the Inuit Tapirisat of Canada (ITC), it is important to remember that the true extent of the problem is not yet known. A recent report, based on a literature search and review, concludes that “because of the epidemic proportions of diabetes reached among the First Nations population in the last couple of generations - despite its previous scarcity- it is important that risk factors and indicators are identified and avoided among the Inuit” (Inuit Tapirisat of Canada, 1999).

At the time of writing this report there was no available Inuit specific diabetes information for gender or age specific comparisons, trends, complications, costs or projections.

Métis People

The Métis are recognized under the 1982 Constitution as being one of the three distinct Aboriginal peoples of Canada. Of mixed Aboriginal and European heritage, the Métis are considered neither First Nations nor Inuit, but as a culturally unique people (Métis National Council, 2000).

According to the 1991 APS, the prevalence of diabetes among the Métis was 5.5% (MacMillan, 1996). This is more than twice the prevalence of diabetes in the Canadian population and is also higher than the rates reported at the time for First Nations living off-reserve. Also based on this survey, 25% of Métis ranked their health as excellent and among all Aboriginal people, Métis reported the greatest level of contact with a physician at 72%, although this is still lower than the Canadian average of 82%.

The results of a literature search conducted by Health Canada identified 6 articles but upon review by the Métis National Council, it was evident that the term 'Aboriginal' was used when referring to First Nations. The MNC report (Métis National Council, 1999), concluded that documentation for relevant data sources exploring diabetes among Métis people was "almost nonexistent" and that the 1991 Aboriginal Peoples Survey is the only published source which mentions "scant" Métis-specific data in relation to diabetes. A recently completed thesis by a University of Manitoba student may well be the most extensive documentation.

25% of Métis ranked their health as excellent.

At the time of writing this report there was no available Métis specific diabetes information for gender, age or regional specific comparisons, or trends, complications, risk factors, costs and projections.

First Nations People

One in four individuals in First Nations communities on-reserve who are over the age of 45 have diabetes.

The availability of considerably more information pertaining to diabetes among First Nations allows a greater range of comparisons to be made. As shown in Figures 4 and 1, age specific diabetes rates are higher among First Nations in all age categories compared to the general Canadian population. This pattern is consistent for both men and women. When controlling for the different age demographics among the two populations, the age-standardized prevalence of diabetes for First Nations people is 3 to 5 times that of the general population (Bobet, 1997; First Nations and Inuit Regional Health Survey National Steering Committee, 1999). It should be mentioned that rates for the Canadian population include type 1 diabetes; a comparison of rates of type 2 diabetes would likely reveal an even greater disparity between populations in the 15-24 and 25-34 age groups, as First Nations communities are primarily affected by this type of the disease. According to results of the First Nations and Inuit Regional Health Survey, one in four individuals in First Nations communities on-reserve who are over the age of 45 have diabetes.

FIGURE 4

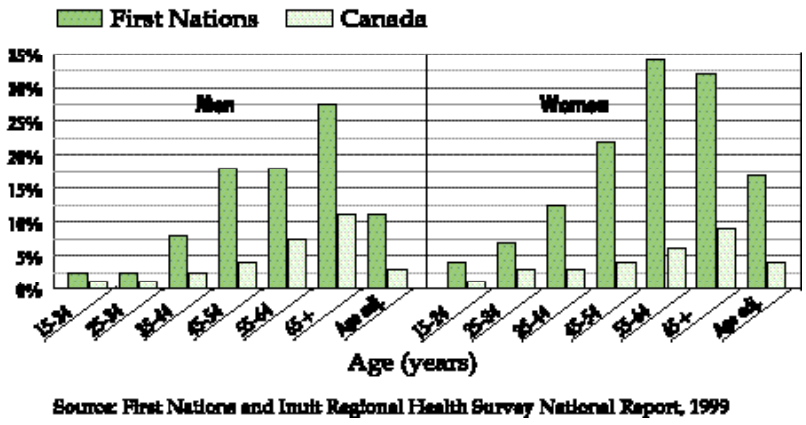
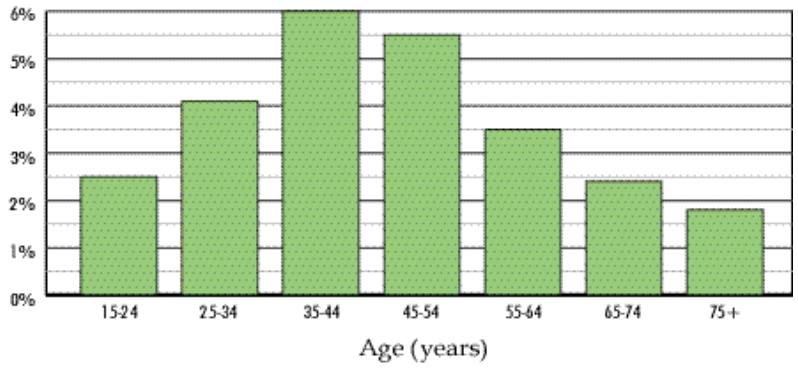


Figure 5 illustrates the high rates that occur in the younger age groups compared to the general population. While this chart is based on data from Manitoba, the same pattern can be seen for all of Canada from the Regional Health Survey results. According to the Regional Health Survey more than half (53%) of First Nations people on-reserve with diabetes are 40 years old or less and 65% are 45 years old or less. In the general population, most people with diabetes are over 60 years.

FIGURE 5

Ratio of Diabetes Prevalence Rates Among Status Indians Compared to General Population, by Age in Manitoba, 1995-1996



Source: Jacobs, 1998

When young people in the general population are diagnosed with diabetes, it is predominantly of type 1.

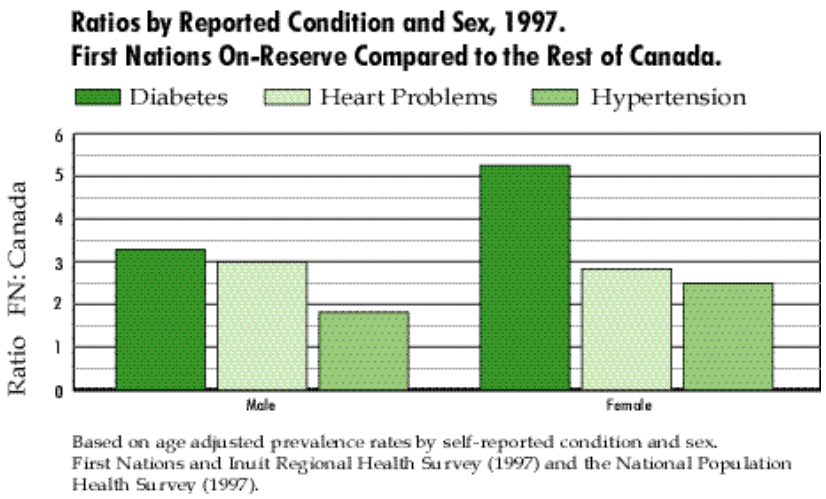
When young people in the general population are diagnosed with diabetes, it is predominantly of type 1 (previously called insulin dependent or juvenile diabetes). However, the cases that are occurring among young First Nations people are predominantly type 2 diabetes (previously referred to as adult onset or non-insulin dependent diabetes). It is alarming that these young cases of type 2 diabetes are being diagnosed in First Nations children as young as 5 to 8 years of age in both northern Ontario (Harris et al, 1996) and Manitoba (Dean, 1992) and the incidence appears to be increasing at a rapid rate (Harris et al., 1996). In Manitoba, the number of First Nations children who have been diagnosed with diabetes rose from 20 in 1990 to 51 in 1995. Sioux Lookout Zone experienced a similar pattern: in 1994, there were 18 children (under age 16) diagnosed with diabetes; in 1997, there were

52 such children (under age 18). In both these areas, girls outnumbered boys by more than five to one among the children diagnosed with type 2 diabetes. Based on data extracted from Health Canada's Non-Insured Health Benefits (NIHB) database, approximately 250 children between 0 and 19 years were identified as having a prescription for diabetes medication. It is recognized that this is an underestimate because not all First Nations and Inuit children would have claims submitted through Health Canada and because children who are being treated with diet and lifestyle alone would not be counted (Palacios and Mathias, 1998).

Approximately 2/3 of the First Nations people diagnosed with diabetes are women.

Approximately 2/3 of the First Nations people diagnosed with diabetes are women (Bobet, 1997). This gender difference is not observed in the entire Canadian population, where diabetes prevalence is significantly higher among males than females (Health Canada, 1999). Figure 6 illustrates the differences between populations by sex. Aboriginal women have over 5 times the rate of diabetes compared to women in the general population, and men have over 3 times the corresponding rate for men.

FIGURE 6



Based on age adjusted prevalence rates by self-reported condition and sex. First Nations and Inuit Regional Health Survey (1997) and the National Population Health Survey (1997).

In addition to the higher overall prevalence of type 2 diabetes in women of most age categories, many women have also been diagnosed with gestational diabetes mellitus (GDM). In the First Nations and Inuit Regional Health Survey (1999), 30% of women with diabetes reported that they were first diagnosed during pregnancy. Existing data on GDM in First Nations people in Canada are sufficient to cause concern among communities and health professionals. A study by Harris et al. (1997b) in Sioux Lookout Zone found GDM rates of 8.4% - the highest rate reported so far in a Canadian population. First-time diagnosis of type 2 diabetes, and not etiologic GDM, may contribute to high rates of GDM observed in some communities (Dean, 2000). In another Sioux Lookout Zone-based study, 70 % of women diagnosed with GDM went on to develop overt diabetes within 3 years (Mohamed and Dooley, 1998). In the general population the typical conversion rate ranges between 25% and 60% over a decade or more (Jovanovic-Peterson, 1994).

Extremely high rates of diabetes have been documented in some specific First Nations communities.

A number of local studies have provided information on the wide range in diabetes rates between communities. Extremely high rates of diabetes have been documented in some specific First Nations communities. For instance, rates among women age 35+ were between 22% and 48% in two Algonquin communities in Quebec (Delisle and Ekoé, 1993); in Haida Gwaii, B.C., 17% of adults over age 35 had type 2 diabetes (Grams et al, 1996); and Sandy Lake, Ontario reports age-adjusted rates of 26% for its population age ten and over, and a prevalence of 54% for women age 50-59 (Harris et al, 1997a; Young et al, 1998).

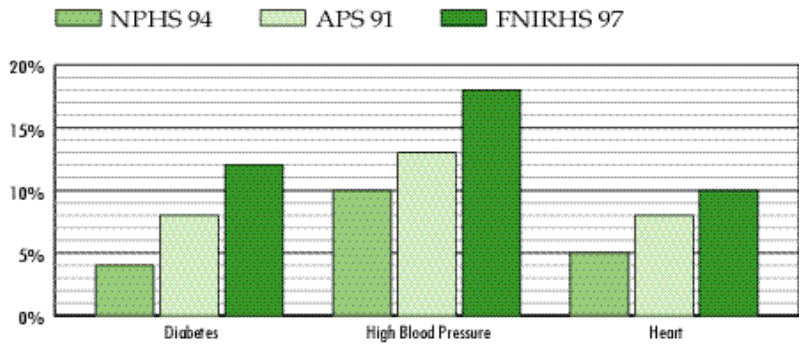
The Cree Board of Health and Social Services of James Bay Diabetes Registry includes 9 communities which have reported diabetes prevalence rates from 5% to 15% (for people 15 years and older) (Cree Board of Health and Social Services of James Bay, 1998). The registry is closely linked with the diabetes program run by nurses, Community Health Representatives and doctors in the clinics. Based on HbA1c measurements taken in the clinic and entered into the registry, 23% of people with diabetes had blood sugars that were high and a further 44% had dangerously high blood sugars. This signals the need for further education, support, management and care.

With sufficient statistical data for the same group, monitored longitudinally for any length of time, it is possible to identify trends. Figure 7 shows the increase in diabetes prevalence rates for First Nations from the 1991 APS and the 1997 First Nations and Inuit Regional Health Survey. With the availability of continuous monitoring of data, a 1983 study in the Sioux Lookout Zone showed a prevalence rate of 2.8% which by 1994, had risen to 3.8% - with nearly 45% of the cases having been diagnosed in the preceding five years (Young et al., 1985; Fox et al., 1994). This change in prevalence rates with time cannot be fully explained by an increased awareness of diabetes nor by improved screening in this population.

For every diagnosed case of diabetes there is an undiagnosed case of Impaired Glucose Tolerance (IGT).

FIGURE 7

Diabetes and Cardiovascular Disease
Time Trends and Comparison to the Canadian Population



Source: Based on data from First Nations and Inuit Regional Health Survey, Aboriginal Peoples Survey and National Population Health Survey.

For the general population, it has been estimated that for every diagnosed case of diabetes there is an undiagnosed case of Impaired Glucose Tolerance (IGT). The latter condition is associated with plasma glucose levels higher than normal, but not high enough for a positive diagnosis of diabetes. It is classified as plasma glucose between 7.8 and 11.0 mmol/L in response to an oral glucose tolerance test. People with IGT are at increased risk for the development of diabetes and cardiovascular disease (Roman and Harris, 1997; Canadian Diabetes Association, Canadian Medical Association, 1998). The only available data on IGT in Aboriginal people are from the Sandy Lake Health and Diabetes Research Project, which

indicated a very high level of IGT in the First Nations population - particularly in young women (Harris et al., 1997a). This population, along with the Ojibwa-Cree community of St Theresa Point First Nation, are the only examples of systematic screening programs for diabetes in Canadian Aboriginal communities to date. In the latter community, schoolchildren aged 4-19 years were screened using anthropometric measurements, fasting glucose and insulin concentrations. It was found that 1.1% of the children had diabetes, 2.7% had IGT, and close to 50% of the children were clinically obese (Dean et al., 1998).

...close to 50% of the children were clinically obese.

COMPLICATIONS OF DIABETES IN FIRST NATIONS

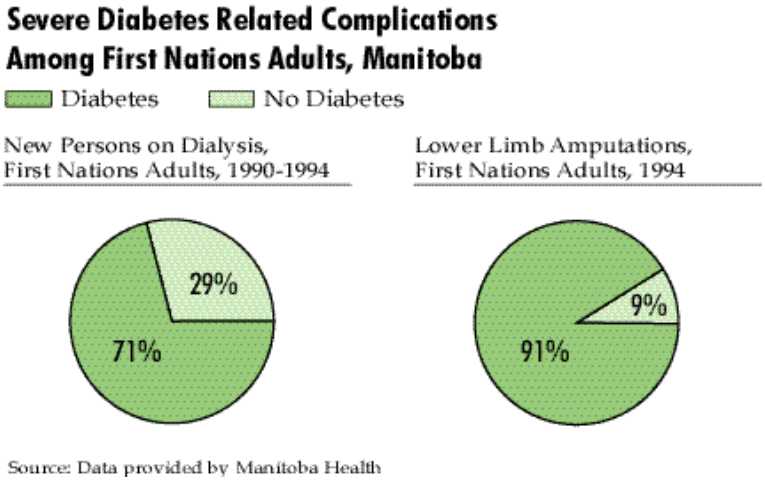
Given that First Nations have such high rates of diabetes, it is not surprising that virtually all of the literature on diabetes complications pertains to First Nations. While we can learn from what is known, more research is needed as gaps still exist in the literature about types of complications, onset and severity of complications faced by Aboriginal people in Canada. The existing literature suggests the following description:

First Nations men and women on-reserve have approximately three times the rate of heart problems and hypertension compared to the general Canadian population.

Figure 6 shows that First Nations men and women on-reserve have approximately three times the rate of heart problems and hypertension compared to the general Canadian population (First Nations and Inuit Regional Health Survey National Steering Committee, 1999). The prevalence of hypertension among First Nations adults with diabetes was 43% compared to just 10% of those without diabetes (Bobet, 1997). A study at Kahnawake found that 13% of people with diabetes had strokes, versus just 3% of a comparable group of people without diabetes - resulting in an odds ratio of 4.5 (Macaulay et al., 1988). The same study found that the risk of having macro vascular disease was six times higher for people with diabetes than for comparable people without diabetes. These ratios are comparable to those observed in the non-Aboriginal population. Half of those with diabetes had significant heart disease leading to heart attacks and coronary bypass surgery (Macaulay et al., 1988). Figure 7 shows the increase in high blood pressure and heart disease reported in the 1991 APS and the 1997 Regional Health Survey as well as a comparison with the National Population Health Survey.

The only available Canadian data on lower limb amputations among Aboriginal peoples are from the Manitoba study of First Nations (Manitoba Health, 1999) where 91% of all lower limb amputations among First Nations are among people with diabetes (Figure 8). A study of Native Americans in Oklahoma showed that the mean age of first amputations was 6.6 years post diagnosis (Lee et al., 1993). In general, morbidity and mortality are elevated among those individuals with diabetes who have undergone an amputation. For the Native Americans in

FIGURE 8



Oklahoma, the 5-year survival rate after first amputation was only 40% (Lee et al., 1993). If individuals at risk are aggressively sought out and treated, up to 50% of amputations can be prevented (Centers for Disease Control, 1991).

Whiteside (1994) documents that the prevalence of diabetic nephropathy is much higher in First Nations than in the general population with diabetes. The rates range from 25-60% following 15 to 20 years with diabetes. In Manitoba, it is estimated that an Aboriginal person is twelve times more likely to have diabetic nephropathy than a non-Aboriginal person. The risk of developing end-stage renal disease (ESRD) is approximately four times that of other Manitobans, and more than half of this ESRD is caused by diabetes. Figure 8 shows that 71% of new persons (First Nations) on dialysis are adults with diabetes. For those Aboriginal people who develop ESRD, the relative risk of being on dialysis is 6.5 times that of a non-Aboriginal patient (Bernstein, 1998). Among First Nations people living in Manitoba, there has been an increase in dialysis starts of more than 400% since 1987 (Manitoba Health, 1997).

Diabetes is known to cause impaired nerve conduction, impotence and depression.

Diabetes causes diabetic retinopathy, which is the leading cause of adult-onset blindness in North American adults. At Kahnawake (Quebec), 25% of patients had retinopathy after 10 years of the disease (Macaulay et al., 1988). Among the Pima Indians of Arizona, serious retinopathy has a frequency rate of 18% (Szathmary, 1994).

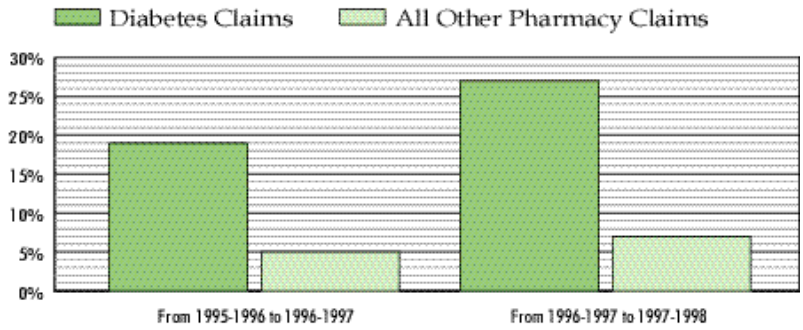
In addition, although there are no data specific to Aboriginal people, diabetes is known to cause peripheral neuropathy (impaired nerve conduction), impotence, and depression.

HEALTH SERVICES/PROGRAMS

Based on the 1991 APS, health care utilization patterns (for all causes) varied considerably. Inuit people reported the lowest percentage that saw a General Practitioner in the previous year at 47%, compared to 67% for North American Indian and 72% for Métis. All of these rates are below the general population average of 82%. For the same question pertaining to Health Professionals, the Inuit rate was considerably higher at 67%, with a slight increase for North American Indians at 73% and Métis at 76% (Newbold, 1998). While data on the number of doctors serving the Aboriginal population are not available, for the general population, in rural areas, one doctor serves every 800 people compared to one for every 200 people in urban Canada (Wood, 1999). The Regional Health Survey results show that usually less than 40% of First Nations on-reserve with diabetes attend diabetes clinics or receive diabetes education (Assembly of First Nations, 1999).

FIGURE 9

Percent Increase in Diabetes Related vs All Other Pharmacy Expenditures, Non-Insured Health Benefits, 1998



Source: Non-Insured Health Benefits,
First Nations and Inuit Health Branch, Health Canada

In rural areas, one doctor serves every 800 people compared to one for every 200 people in urban Canada.

In the last three years, diabetic drug claims through the NIHB program have increased 78% and have reached an annual cost of $13 million. As shown in figure 9, diabetes claims increased four times compared to all other pharmacy claims over one year. Based on recent NIHB data, oral hypoglycemic medication was dispensed to 70% of individuals requiring diabetic medication. Insulin was dispensed alone to

11% of all cases, with 19% receiving these medications in combination (Palacios and Mathias, 1998). While the accuracy of the data is questionable when referring to all First Nations and Inuit people, it is worth noting the high percentage of insulin prescriptions given the high rate of type 2 diabetes in a relatively young population. This brings forward questions about the proper management of diabetes in this population and may be related to the relatively young age at which type 2 diabetes is diagnosed. Further study is required to confirm if the type 2 diabetes patients are being treated with insulin when they are not truly insulin dependent. Data from a southern Alberta study by Ross and Fick (1991) show that over 80% of Aboriginal insulin users have adequate endogenous production of insulin, compared to 40% of non-Aboriginal insulin users (First Nations and Inuit Regional Health Survey National Steering Committee, 1999).

None of the 5 classes of oral drugs used in type 2 diabetes in adults has been tested in children or adolescents.

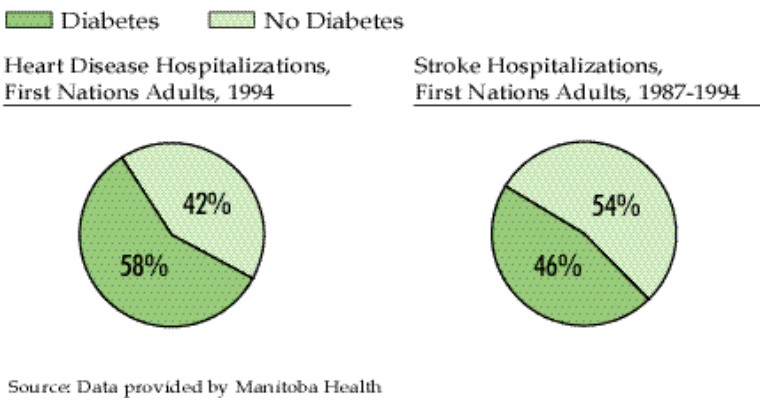
According to Professor Heather Dean at the University of Manitoba, the majority of Aboriginal children with diabetes have type 2 diabetes. An important research issue which needs to be addressed is the efficacy of treating children with oral hypoglycemic drugs. None of the 5 classes of oral drugs used in type 2 diabetes in adults has been tested in children or adolescents for efficacy or safety since this disease in children is such a new problem. Insulin, given by injection, is the only drug that has been used worldwide since 1921 for children with diabetes, but only in type 1 diabetes in children. Insulin therapy for children with type 2 diabetes has not been studied to determine efficacy, optimum schedule, or outcome (Dean, 1999).

The Union of Ontario Indians (Maguire, 1998) reported on the use of hospital separation data collected by the Canadian Institute for Health Information for assessing the health of First Nations persons living on-reserves in Ontario. When considering the most common diagnoses for which First Nations women are admitted to acute care hospital facilities, diabetes is one of the top two health concerns. Based on this study, Standardized Morbidity Ratios (SMR) comparing the general population to First Nations men and women living on-reserves in Ontario from 1993-1997, were 3.5 and 3.3 respectively. Corresponding SMRs for those over 50 years of age were 5.4 for women and 4.2 for men. Among Status Indians in

Manitoba, almost 60% of hospitalizations for heart disease and approximately half of the hospitalizations for stroke occur among people with diabetes (Manitoba Health, 1997). See Figure 10.

FIGURE 10

Hospitalizations for Diabetes Related Complications Among First Nations Adults, Manitoba



Source: Data provided by Manitoba Health

The Northern Medical Services in Saskatchewan found hospitalization rates for diabetes and diabetes-specific complications among First Nations communities in the south higher than those found in the north, although a slight increase in the north and decrease in the south were observed between 1982 and 1994. In 1990, rates in the south were 25% higher than admission rates in the north. This discrepancy in hospitalizations may reflect differences in prevalence of disease, but could also be a result of differences in availability of health services and/or the threshold of admission for diabetes (Irvine et al., 1999).

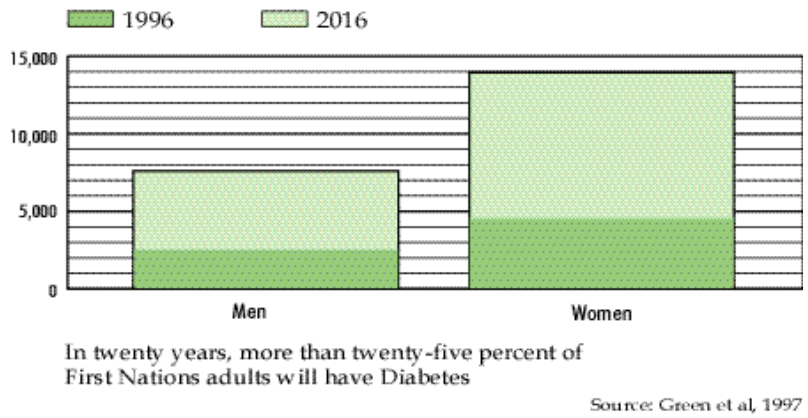
In 1990, rates in the south were 25% higher than admission rates in the north.

Projections

Over the next 20 years, there will be a 10-fold increase in the rate of carsiovascular disease.

In Manitoba, it has been estimated that the number of First Nations diabetes cases can be expected to increase 3-fold over the next 20 years (Green et al., 1997) which would result in overall diabetes prevalence rates of 27% (Figure 11). As the prevalence of diabetes increases and the population ages, it is expected that there will be an increase in rates of complications. A study in Manitoba estimated that over the next 20 years, there will be a 10-fold increase in the rate of cardiovascular disease; a 5-fold increase in strokes; 10 times as many dialysis starts; 10 times the rate of lower extremity amputations; and 5 times the rate of blindness between the years 1996 and 2016 (Green et al., 1997). A corollary is that diabetes expenditures, which took 2.4% of the provincial health budget in 1996, will increase to take over 7% of the provincial health budget.

FIGURE 11

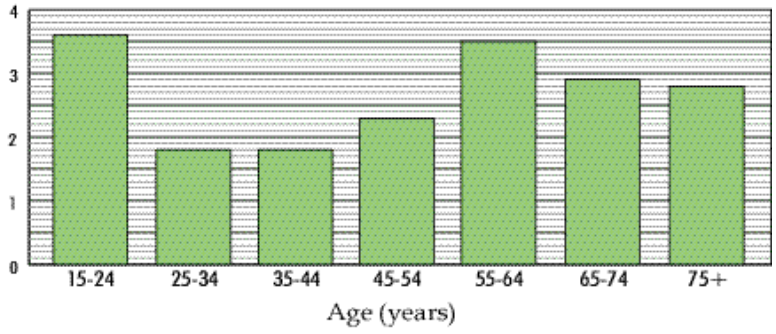


Cost

A study by Jacobs (1998) estimated the cost of diabetes among status Indians in Manitoba, and compared these costs to those of status Indians without diabetes, and to persons in the general population - both with and without diabetes (Figure 12).

FIGURE 12

Ratio of Hospital Admission Rates Among Status Indians With Diabetes Compared to the General Population With Diabetes Manitoba, 1995-1996



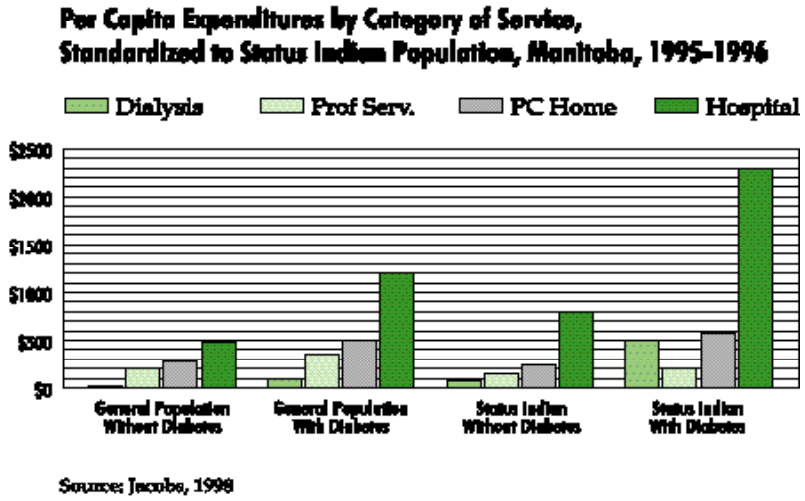
Source: Jacobs, 1998

After adjusting for age, results indicated the per-person annual cost for status Indians with diabetes was $3,657, while that for the general population with diabetes was $2,169. Therefore, the cost was 68% higher for status persons with diabetes. In comparison, the cost for status persons without diabetes was $1,359, while the cost for the general population without diabetes was $1,011 (Figure 13). Much of the difference in cost was due to high hospitalization costs for status persons with diabetes. Upon further decomposition of the data, it was determined that the high hospitalization costs were due to elevated rates of hospitalization, much of which was in diagnostic areas that indicated complications of diabetes.

The cost was 68% higher for status persons with diabetes.

The cost of providing health care services to the entire status Aboriginal population of Manitoba is $46.5 million.

FIGURE 13



Also estimated were excess costs due to a higher prevalence of diabetes in the status population, and due to higher utilization in status persons with diabetes (as compared with persons in the general population). It is estimated that the cost of providing health care services to the entire status Aboriginal population of Manitoba is $46.5 million. Using this figure, Jacobs calculated that $7.4 million less would be spent if per-person costs remained the same for the Aboriginal population with and without diabetes, but the diabetes prevalence rate was reduced to that of the general population. It was also estimated that roughly $6.9 million less would be spent if prevalence rates remained higher among Aboriginal persons, but per-person costs were the same as those of the general population. The study concluded that diabetes costs in the status Aboriginal population are high, due to both the high prevalence rate of diabetes and to substantial utilization of health care services by persons with diabetes.

Data Limitations

An extensive literature search was conducted to identify published articles which address diabetes among Inuit and Métis people, as well First Nations living off-reserve. Most of the available national and community level data on diabetes and Aboriginal people pertain to First Nations on-reserve, with some provincial data relating to all status Indians regardless of location. The need for more information regarding diabetes in the Métis and Inuit people has been identified. National surveys conducted by Statistics Canada, for example the National Population Health Survey, exclude First Nations on-reserve and the territories, which have a high proportion of Inuit, First Nations and Métis people. Therefore, a considerable gap in the amount of available information exists. Provincial data sources such as physician billing and hospitalization records contain information about Aboriginal people, but most provinces do not have a way of identifying who they are. Some information is available from the First Nations and Inuit Health Branch of Health Canada, through community-based health services and programs, and the Non-Insured Health Benefits program.

Another important factor to consider is the availability of data and information pertaining to First Nations, Métis and Inuit peoples, and factors that affect the accuracy of the data. It is likely the vast majority of the available data represent an underestimation of the actual extent of the problem. This may be due to culture, language, remoteness, and other barriers to accessibility to both health services where information may be captured, and to health surveys. There are major gaps in information about diabetes and associated risk factors among Métis and Inuit peoples. While the vast majority of the current data relate to First Nations, these data are still limited on an aggregated national level, although quite extensive in some community level programs.

It is likely the vast majority of the available data represent an underestimation of the actual extent of the problem.

GLOSSARY

Adapted from the *Background Paper for the Development of an Aboriginal Diabetes Strategy: Report of the Working Group*, June 1998, by the Medical Services Branch of Health Canada.

Age Standardization

Age Standardization is a statistical adjustment that allows for a more accurate comparison of disease rates or death between two populations when they have very different age structures.

Body Mass Index

An anthropometric measurement used to screen individuals for clinical obesity and associated chronic diseases. The index is the person's weight, in kg, divided by his or her height, in m^2.

Cardiovascular Disease (CVD, Heart Disease)

Cardiovascular disease is defined as any abnormal condition characterized by dysfunction of the heart and the blood vessels. People with diabetes have a substantially increased risk of developing cardiovascular disease. Complications of cardiovascular disease include stroke, heart attacks, congestive heart failure and an increased risk of coronary bypass surgery.

Diabetic Neuropathy

A disease of the nervous system. Diabetes can cause damage to the nervous system, resulting in loss of sensation and motor function, particularly in the lower limbs. This condition is seen frequently in older people with diabetes, and can lead to amputations.

Gestational Diabetes Mellitus (GDM)

A form of diabetes which develops during pregnancy. It occurs when the mother's glucose level rises due to hormone secretions and she cannot produce enough insulin to handle the higher blood glucose levels. Although gestational diabetes usually does not last after pregnancy, women who have had gestational diabetes have a higher risk of developing type 2 Diabetes Mellitus in the future.

HbA1c

Glycosylated hemoglobin. A clinical assay used to assess overall glucose control in patients with diabetes. The assay reflects glucose control over the preceding 2 to 4 months.

Hypertension

A medical term for high blood pressure. A common disorder which is characterized by a blood pressure exceeding 140/90. Hypertension can lead to health problems such as heart attacks and strokes. The risk of acquiring the disorder is increased by a number of conditions: inactivity, obesity, high salt diet, smoking, and family history.

Impaired Glucose Tolerance (IGT)

An intermediate form of disordered glucose metabolism in which blood glucose levels are higher than expected, but do not meet the diagnostic criteria for diabetes. Persons with IGT have a higher risk of developing type 2 Diabetes Mellitus in the future.

Incidence

The number of new cases of disease, or events in a population at risk over a particular period of time. Incidence is often expressed as a ratio, in which the number of cases is the numerator and the population at risk is the denominator. For example, the number of new cases of type 2 diabetes in First Nations children in Manitoba during a particular period of time over the number of First Nations children in Manitoba for that period of time.

Microalbuminuria

Microalbuminuria is a condition in which small amounts of albumin are excreted in the urine and needs a special test for diagnosis. Albumin is a type of protein that is normally found in the blood. The presence of albumin in the urine indicates damage to the kidneys from diseases such as diabetes. Intensive treatment of persons at risk may reverse this process.

Morbidity Rate

Morbidity Rate is a type of incidence rate. It is the rate of non-fatal, new cases of a disease in the total population at risk during a specific period of time.

Mortality Rate

The number of people who die from a specific illness in relation to the total population. Mortality rates are usually expressed as the number of deaths per 1,000, 10,000, or 100,000 persons.

Odds Ratio

Estimates the magnitude of an association between an exposure (e.g. smoking) and a disease (e.g. lung cancer) and indicates the likelihood of developing the disease in the exposed group relative to the unexposed. For example, to estimate the magnitude of the association between smoking and lung cancer, an odds ratio of 10 means that smokers are 10 times more likely to develop lung cancer than non-smokers.

Oral Glucose Tolerance Test

A diagnostic test in which 75 g of glucose is administered to the subject orally, and plasma glucose is measured two hours later. Plasma glucose levels above 11.1 mmol/L indicate diabetes mellitus; levels between 7.8 and 11.0 indicate impaired glucose tolerance.

Peripheral Neuropathy

Any functional or organic disorder of the peripheral nervous system. Peripheral neuropathy manifests itself as absence of reflexes and impaired nerve conduction, and usually involves pain and decreased sensation in the lower limbs.

Prevalence

The number of old and new (existing) cases of a disease or occurrences of an event during a particular period of time. Prevalence is expressed as a ratio in which the number of events is the numerator and the population under consideration is the denominator.

Renal Failure/End Stage Renal Disease (ESRD)

ESRD is a condition of the kidneys that can be caused by diabetes. It is characterized by an inability of the kidneys to carry out their normal functions of excreting wastes, concentrating urine, and conserving electrolytes. This condition may be acute or chronic, and often must be treated with dialysis or kidney transplant to prevent death.

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