Canadian Journal of Cardiology 31 (2015) 1124–1129

Review

Preventing Cardiovascular and Renal Disease in Canada's Aboriginal Populations

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ABSTRACT

Cardiovascular and renal disease are highly prevalent in Canada's Aboriginal population even though rates of cardiovascular disease are falling in the rest of the country. High and rising prevalence rates of diabetes must be addressed to impact significantly on global cardiovascular and renal risk. Type 2 diabetes is occurring in Aboriginal youth, putting them at greater risk of long-term complications. The reasons for the sudden upswing in diabetes rates in the past 60 years are a result in large part to social determinants of health, which for Aboriginal people include the multigenerational effects of colonization and consequences of the residential school system. Addressing cardiovascular and renal risk therefore requires the knowledge and skills to implement clinical practice guideline–based interventions, the ability to create culturally safe chronic disease management programs in partnership with Aboriginal communities, and advocacy across sectors for improvements in the social determinants of health.

RÉSUMÉ

Les maladies cardiovasculaires et rénales ont une prévalence élevée dans la population autochtone du Canada, malgré des taux de maladies cardiovasculaires en baisse dans le reste du pays. Les taux élevés et de hausse de la prévalence du diabète doivent être considérés pour leur impact significatif sur le risque cardiovasculaire global et rénal. Le diabète de type 2 touche les jeunes autochtones, les mettant plus à risque de complications à long terme. Les raisons de la soudaine hausse des taux de diabète des 60 dernières années sont dues en grande partie à des déterminants sociaux de la santé qui, concernant les peuples autochtones, comprennent les effets multigénérationnels de la colonisation et les conséquences du système des pensionnats. Aborder le risque cardiovasculaire et rénal nécessite donc les connaissances et les compétences pour mettre en œuvre des interventions basées sur un guide de pratique clinique, la capacité à créer des programmes de gestion des maladies chroniques culturellement sûrs en partenariat avec les communautés autochtones, et de plaider dans tous les secteurs pour des améliorations dans les déterminants sociaux de la santé.

Canada's Aboriginal population includes approximately 1.4 million First Nations, Métis, and Inuit people. This makes up 4.3% of the Canadian population and is considered 1 of the largest Aboriginal populations in the world. Aboriginal people in Canada experience numerous health inequalities that lead to a lowered life expectancy of 7.4 and 5.2 years, respectively, for Canadian Aboriginal men and women than is seen for the rest of the Canadian population.[1] Cardiovascular disease is more common, and end stage renal disease (ESRD) in Canada's Aboriginal population is more frequent, largely because of the high prevalence of diabetes.[2] In the non-Aboriginal population in Canada, mortality from coronary artery disease is falling because of improvements in medical and surgical treatment and improvements in cholesterol and blood pressure (BP) management, offset somewhat by rising rates of diabetes and obesity.[3] Data for First Nations individuals show a smaller reduction of cardiovascular events in First Nations men than in non-First Nations men; in First Nations women, the rates are actually increasing, largely because of higher rates of diabetes.[4] The cardiometabolic risk in Métis individuals is similarly high and is more similar to First Nations populations than to non–First Nations populations.[5] These data suggest that Canada's Aboriginal community appears to be missing out on the benefits of cardiovascular risk factor modification. The purpose of this article is to help the practitioner understand the origins of the greater cardiovascular risk experienced by Canada's Aboriginal population and how it might be addressed, including issues of health care marginalization and the need for cultural safety and advocacy.

Received for publication April 14, 2015. Accepted May 29, 2015.

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See page 1127 for disclosure information.

http://dx.doi.org/10.1016/j.cjca.2015.05.024

Background

Traditional cardiovascular risk factors, in addition to the social determinants of health, play a major role in the lack of reduction in cardiovascular risk in Aboriginal communities. In the **S**tudy of **H**ealth **A**ssessment and **R**isk **E**valuation in **A**boriginal **P**eoples (SHARE-AP) population study, the increased prevalence of cardiovascular and atherosclerotic disease in Aboriginal individuals was associated with a higher prevalence of dysglycemia, obesity, dyslipidemia, hypertension, and smoking than in individuals of European ancestry, and in the multivariate analysis, poverty was strongly and independently associated with cardiovascular disease.[6] To reduce cardiovascular risk factors in Aboriginal populations, it is essential to understand the underlying political, economic, and social contexts that have a profound influence on the development of cardiovascular and renal risk factors in this population.[7] The social determinants of health such as low income have been strongly associated with obesity and diabetes in the general population.[8] Social determinants are also important for Aboriginal health and include income, education, employment, living conditions, lack of adequate housing, and access to culturally competent health services. Aboriginal health is also affected by cultural factors and the consequences of colonialism, including loss of language and ways of life and dispossession of traditional lands resulting in food insecurity, environmental deprivation, and spiritual, emotional and mental disconnectedness.[6,9] Further compounding these issues are frequent experiences of social exclusion, discrimination, and racism.[7,10] All these issues increase the complexity of primary and secondary prevention strategies.[11,12] Health care practitioners can help to address these issues through an advocacy role, with the goal of improving health care outcomes; these practitioners would benefit from additional professional education on how advocacy can address poverty and health resources in Aboriginal communities.[13]

Diabetes was virtually unknown in Canadian Aboriginal communities before the 1940s but has increased dramatically with the discouragement of traditional lifestyles resulting from the government-imposed reserve system and the impact of residential schools.[14] Recent national survey data show that the age-standardized prevalence of diabetes among First Nations individuals living on a reserve is 17.2% and 10.3% in those living off a reserve. Among Métis individuals, it is 7.3%, and in the non-Aboriginal and Inuit population it is 5.0%.[15]

The sudden onset of diabetes in Aboriginal populations in the 1960s led to the question of whether there is a thrifty genotype that would have been helpful in times of "feast or famine" but that became maladaptive after the shift to calorie-dense fast foods and a more sedentary lifestyle.[16] Despite many studies, a single gene or gene complex has not been found, and the idea of a single thrifty gene has been replaced by the knowledge that the linked conditions—type 2 diabetes, hypertension, and obesity—are all associated with genetic complexity and are greatly influenced by modifiable factors such as health behaviours and other social determinants of health.[17] However, in the Oji-Cree of Sandy Lake in Northern Ontario, Canada, an interesting genetic polymorphism, the G319S variant of the hepatic nuclear factor gene (*HNF1A*), has been discovered to be associated with an accelerated onset of type 2 diabetes by approximately 7 years for each S319 allele.[18] Complicating this story further is the finding that this effect has an interaction with smoking—the association with diabetes is much stronger in smokers than in nonsmokers.[18] Despite this intriguing finding, we must take care not to assign the cause of the higher risk of diabetes in Aboriginal populations to concepts like the "thrifty gene hypothesis" based on the social construct of "race." Instead, recent research serves to underscore the importance of epigenetic factors and social determinants that mediate the onset and progression of type 2 diabetes.[19,20]

Obesity, often a precursor for diabetes, is also associated with a greater likelihood of hypertension in Aboriginal populations.[21] The prevalence of overweight (body mass index [BMI] of 25-29) in First Nations adults is one third, and similarly one third are obese (BMI of 30+), whereas 5.4% of the obese are morbidly obese (BMI of 40+).[22] The risk of the development of hypertension over 2 years in obese individuals with high normal BP is 40%.[23] Overweight and obesity account for up to 75% of the risk for essential hypertension.[24] Factors contributing to obesity in Aboriginal communities include high birth weight, sedentary lifestyle, and substituting convenience foods for traditional foods.[25,26] In the United States, the reported physical activity levels in Native American adults were lower in the 2000s than in the 1990s.[27] It will be necessary to understand the causes of lower physical activity before this trend can be reversed. Increasing physical activity contributes to the management and prevention of both type 2 diabetes and hypertension.[28] These considerations provide targets for primary prevention programs for hypertension and diabetes.[15,29,30] Approaches to reverse the factors associated with obesity must start with the community and not contribute to or broaden the gap created by social economic status inequities.[31] The presence of obesity may be a helpful means to identify candidates for health behaviour changes to prevent progression to diabetes and hypertension.

Heart disease and renal disease are more common with exposure to hypertension and diabetes. The onset of diabetes at a younger age leads to more years of exposure to the condition. Young Aboriginal women appear to be at greatest risk, with diabetes occurring at an earlier age in addition to their risk for the development of gestational diabetes, with rates increased compared with all Canadian pregnancies.[32] Women with gestational diabetes are more likely to have type 2 diabetes and have more adverse cardiovascular outcomes over time,[33] and type 2 diabetes is more likely to develop in their children.[34,35] In a population survey from Alberta, Canada, patients with known Aboriginal status (predominantly First Nations in this survey) who had an incident admission for heart failure were > 10 years younger (62.6 vs 75.4 years) than non-Aboriginal Albertans with heart failure.[36] Adjusted mortality rates in the Aboriginal patients were 40% higher 3 years after the incident heart failure admission and were associated with a higher prevalence (45% vs 29%) of and a longer duration of diabetes.[36] The Aboriginal cohort also had less access to specialist follow-up care after the incident heart failure admission. Approximately 50% of Fist Nation individuals with diabetes were found to have albuminuria in the CIRCLE study.[37] Further, First Nations individuals who have diabetes at a younger age had a greater incidence of ESRD associated with the longer exposure to diabetes.[37] Diabetes may therefore explain much of the greater risk for cardiovascular and renal disease in Aboriginal communities.

Interventions to prevent and manage diabetes should be community directed, culturally appropriate, and designed in the context of local traditions, language, and culture, all while