Diabetes awareness and body size perceptions of Cree schoolchildren

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Abstract

Native American Indians and First Nations are predisposed to obesity and diabetes. A study was done to understand Cree schoolchildren’s diabetes awareness and body size perceptions in two communities that had diabetes awareness-raising activities in the Province of Quebec, Canada. Children (N = 203) in grades 4–6 were classified into weight categories using measured heights and weights and grouped on diabetes awareness based on dichotomous responses to the question ‘Do you know what diabetes is?’ Children selected a drawing of an American Indian child whom they felt most likely to get diabetes and described their body size perception using a closed response question. Although 64.5% of children were overweight or obese, most (60.1%) children considered their body size to be ‘just right’, with 29.6% considering it ‘too big’ and 10.3% considering it ‘too small’. A minority (27.6%) of children had diabetes awareness. These children were more likely than children without diabetes awareness to consider their body size too big (42.9 versus 24.5%) and to choose an obese drawing as at risk for diabetes (85.7 versus 63.3%, odds ratio 3.48 and 95% confidence interval 1.53–7.91). Culturally appropriate health education programs to increase schoolchildren’s diabetes awareness and possibility to have a healthy body weight are important.

Introduction

First Nations in Canada and Native American Indians in the United States have higher rates of obesity and serious complications of obesity including type 2 diabetes than the general population [1, 2]. Escalating concern about diabetes in American Indian and First Nations children is justified given that obesity is highly prevalent in children and youth in these cultural groups [3–7]. In addition to heightened chronic disease risk, obese children in North America often have body size dissatisfaction and a desire for thinness making them susceptible to eating disorders [8], yet there has been only limited study of body size perceptions in American Indian and First Nations schoolchildren [9–13]. An individual’s sociocultural environment shapes their perceptions of a healthy and desirable body weight [14, 15]. Among some First Nations, there is a preference for larger body shapes with heaviness as a sign of health and the ideal of attractiveness [12, 13]. There is still a great deal to learn about the way in which the body is perceived by First Nations from a sociocultural perspective [16]. To develop health promotion strategies for diabetes prevention in American Indian and First Nations schoolchildren, it would be important to have an appreciation for children’s body size perceptions in relation to their body weight class, in addition to information about children’s awareness of diabetes and its association with obesity [17].
The Cree, who live in both the United States and Canada, are the largest language group of First Nations in Canada. In the Cree communities of Eeyou Istchee in northern Quebec, the majority of children and adults are overweight or obese [18–20]. One in every five Cree adults in the region over the age of 20 years has type 2 diabetes and almost half of Cree living with diabetes are diagnosed before 40 years of age [21]. Most Cree children have at least one adult family member with the disease. Given the high prevalence of diabetes in First Nations in Canada, many diabetes awareness activities are scheduled in First Nations communities. During National Diabetes Awareness Month in November of each year, Cree children in Eeyou Istchee are provided lessons about diabetes in school dependent on the availability of a Community Health Representative, who is a person from the Cree population trained as a health care advocate and health educator [22]. Diabetes awareness-raising activities such as Sadie’s walk take place annually in Eeyou Istchee and many other First Nations communities in Canada. Sadie’s Walk has become a flagship annual event in Eeyou Istchee to raise diabetes awareness in the communities and both adults and children participate in the walk. Despite the implementation of these and other types of educational programs aimed at Cree of all ages in Eeyou Istchee, the prevalence of diabetes continues to increase in the communities [21].

To prevent the development of obesity-related type 2 diabetes in First Nations, it might be important to raise awareness of the disease at a young age. In Eeyou Istchee, there are no data about children’s awareness of diabetes, their understanding of obesity as a risk factor for diabetes or their body size perceptions. The current study was done to gain information about these topics in two Cree communities. It was intended that this information would provide an indication of whether additional education efforts for children in the communities were required to increase knowledge of diabetes. The information about body size perceptions would indicate if obesity prevention strategies developed for Cree children must be sensitive to body image issues. The Cree Board of Health and Social Serv-ices of James Bay (Quebec), local Cree communities and pan-Canadian organizations such as National Aboriginal Health Organization and National Aboriginal Diabetes Association, in addition to government organizations that aim to improve Aboriginal health, would benefit from such information. The finding would also provide baseline information that could be used in the future to evaluate the success of education efforts to improve awareness of diabetes in children in the Cree communities.

**Methods**

The Emiyuu Ayayaachiit Awaash (Active Kids) Project was a study conducted in 2004 and 2005 that examined the weight status, nutrition, health behaviors, diabetes awareness and body image of children in grades 4–6 in two Cree communities. The children’s mother tongue was predominantly Cree, although all children spoke English and the language of instruction at the schools was both English and Cree. The study was conducted in English, with the assistance of a Cree interpreter in the school where children were less fluent in English. Details about children’s fitness, activity levels, dietary intake and anthropometry published elsewhere point out that the majority of participating children had high abdominal adiposity, poor dietary intake and low levels of physical activity and fitness [19, 23]. Cree children irrespective of weight status have diets that are energy-dense and low in nutrient rich foods, with many children potentially at risk for micronutrient inadequacy. Most foods contributing to calories and dietary fat are sweetened beverages and snack foods, and almost all children consume less than five fruits and vegetables each day [23]. The specific aims of the current study were to analyze data from the Active Kids Project to find out the percentage of children who had diabetes awareness and who could identify an obese figure as at risk for developing type 2 diabetes and to examine the relationship among children’s diabetes awareness, weight status and body size perceptions.
The study was approved by the Human Ethics Research Board, Faculty of Agriculture, Forestry and Home Economics, University of Alberta; The Cree Board of Health and Social Services of James Bay (Quebec) and the two school principals. All participating children had written parental consent. Steering committees comprising community members ensured cultural sensitivity of the research. A Research Committee of the Cree Health Board reviewed and approved manuscripts submitted for publication.

Evaluation measures

Body mass index (BMI, kg/m²) was determined from children’s measured heights and weights and was calculated to the nearest 0.01 kg/m². Height was measured using a set square and a tape measure and recorded to the nearest centimeter. Weight was measured using a portable scale (Health-O-Meter Professional Scale; Model HAP300-01; Boca Raton, FL, USA). The university researchers performing the measurements were trained in the proper measurement techniques by an Exercise Physiologist. International Obesity Task Force age- and gender-specific cutoffs were used to categorize a child’s BMI as normal, overweight or obese [24]. To assess children’s body size perception, children were asked, ‘What do you think of your body size?’ where responses were ‘too big’, ‘too small’ and ‘just right’. Diabetes awareness was determined by asking children to respond ‘yes’ or ‘no’ to the question ‘Do you know what diabetes is?’ Drawings of eight American Indian boys and girls arranged in order from thin to obese were used to evaluate children’s perception of the association between body size and risk of diabetes [10]. Similar to a study by Rinderknecht and Smith [11] among American Indian youth to discern understanding of diabetes using the same drawings, Cree children were asked ‘Who might get diabetes when they grow up? Circle one’. Girls were shown female figures and boys were shown male figures. The drawings were an artist’s rendition of the continuum of thinness to obesity and were not clinical representations of underweight or overweight based on BMI. To analyze responses, figures were numbered from one (smallest) to eight (largest). For the purposes of this study, the largest three figures numbered 6–8 with evident abdominal obesity were considered most at risk for type 2 diabetes; figures 1–3, the smallest of which appeared emaciated, were considered to represent thinness and figures 4 and 5 were considered to have a relatively healthy shape.

Statistics

The chi-square test was used to examine associations between diabetes awareness (yes versus no) and the figure chosen as most likely to get diabetes (thin, healthy and obese), a child’s weight category (normal, overweight and obese) and a child’s body size perception (too big, too small and just right). Binary logistic regression was used to calculate the odds ratio (OR) and 95% confidence interval (CI) of children with diabetes awareness selecting an obese figure as at risk for diabetes as compared with children without diabetes awareness (figures 1–5 were coded as not obese and figures 6–8 were coded as obese). Statistical significance was established a priori at a P value <0.05. Statistical analyses were performed using SPSS for Windows version 14.0.

Results

Two hundred and three of the 225 students who regularly attended school participated in the study. Of these children, 35.5% had a normal body weight, 30.5% were overweight and 34.0% were obese. Altogether, 27.6% of children responded ‘yes’ to the question ‘Do you know what diabetes is?’ and were considered to have diabetes awareness. Diabetes awareness did not differ significantly among children in the three weight categories (Table I), between genders or among grade levels (data not shown). The majority (69.5%) of children chose one of the three obese drawings as likely to get diabetes, whereas 13.3% chose one of the three thinnest figures as most at risk for diabetes. As compared with children without diabetes awareness, children with diabetes awareness were more likely to choose an obese drawing as at risk for
diabetes (85.7 versus 63.3%, OR 3.48 and 95% CI 1.53–7.91) and were less likely to choose a thin figure as at risk for diabetes (3.6 versus 17.0%, \(P < 0.05\)) (Table I).

Most children (60.1%) felt that their body size was just right, 29.6% felt that their body size was too big and 10.3% felt that it was too small. Of obese, overweight and normal weight children, 40.6%, 67.7% and 72.2%, respectively, considered their body size to be just right. Of the 10.3% of children who considered their body size too small, 76.2% were normal weight and 23.8% were overweight or obese. A greater proportion of children with diabetes awareness than children without diabetes awareness stated that their body size was too big (42.9 versus 24.5%, \(P < 0.05\)). This same trend could be observed for children within each weight category (Table II).

### Discussion

Type 2 diabetes is highly prevalent in First Nations in Canada and is one of the main public health issues in the Cree territory of Eeyou Istchee in the Province of Quebec [21]. Cree elementary schoolchildren would be anticipated to have knowledge of diabetes by virtue of its overwhelming presence in the communities and numerous campaigns designed to raise awareness about the disease, yet, less than one in three Cree elementary schoolchildren in the current study had awareness of diabetes based on an affirmative response to the question ‘Do you know what diabetes is?’ When asked to select a drawing of a child who might get diabetes when they grow up, most (69.5%) Cree children chose one of the three obese drawings; however, 13.3% of children, the majority who responded ‘no’ to ‘Do you know what diabetes is?’ chose one of the two thinnest drawings as most likely to develop diabetes. Using the same drawings, a study of American Indian children aged 5–18 years found that 60.0% of boys and 51.3% of girls chose the largest figure as the most likely to develop diabetes [11]. These results indicate that Cree
children in the present study and American Indian children and youth do not always appreciate the contribution of obesity to diabetes risk.

Given type 2 diabetes awareness-raising campaigns and the prevalence of type 2 diabetes in Cree communities, it is possible that more children were aware of diabetes than was captured by their affirmative response to the question about diabetes. This would explain why a greater percentage of children identified an obese drawing as at risk for diabetes than had diabetes awareness. It can be conjectured that some children had knowledge of diabetes but responded truthfully that they did not understand the disease. The word diabetes possibly was not culturally appropriate for some children who may have been more familiar with terms other than diabetes used to describe the disease in English or Cree such as high blood sugar or sweet blood. There is no Cree word that directly translates as diabetes [25]. Children with diabetes awareness were not more likely to be obese than children without diabetes awareness, but were more likely to perceive their body size as too big and to identify a drawing of a youth with obesity as likely to get diabetes. The results suggest that children’s affirmative responses to the question about diabetes were mostly a valid indication of diabetes knowledge.

Children who chose a thin drawing as most likely to get diabetes may have been guessing; have truly believed that thinness was a risk factor for diabetes or may have only had awareness of type 1 diabetes, which has weight loss as a symptom. This latter explanation is unlikely given that type 2 diabetes is vastly more prevalent than type 1 diabetes among First Nations and American Indians [1, 2]. In questioning young children about diabetes, it is not clear how one would describe the difference between type 1 and type 2 diabetes without confusing them. For this reason, the generic term ‘diabetes’ was used in this and other studies [11] with children to assess perception of type 2 diabetes risk.

Despite most children being overweight or obese, the majority indicated that their body size was just right. The seeming acceptance of a large body size among Cree children may have been due, in part, to ignorance about the health risks of excess weight considering that children without diabetes awareness were the least likely to consider their body size to be too big. It is important to note that the preponderance of children who felt that their body size was too small had a BMI that was in the healthy range. There are ethnic and cultural differences with respect to ideal body types and acceptable body weights [14, 15]. Some First Nations women in Canada feel fat in urban areas dominated by ‘white culture’ but feel thinner in their home communities where their Aboriginal culture predominates, indicating that body size perceptions change depending on the sociocultural influences of women’s environments [26]. Among Cree adults in Eeyou Istchee where

<table>
<thead>
<tr>
<th>Do you know what diabetes is?</th>
<th>Weight category</th>
<th>Normal</th>
<th>Overweight</th>
<th>Obese</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Normal</td>
<td>2 (13.3)</td>
<td>7 (30.4)</td>
<td>15 (83.3)</td>
<td>24 (42.9)</td>
</tr>
<tr>
<td></td>
<td>Overweight</td>
<td>3 (20.0)</td>
<td>1 (4.3)</td>
<td>0 (0)</td>
<td>4 (7.1)</td>
</tr>
<tr>
<td></td>
<td>Obese</td>
<td>10 (66.7)</td>
<td>15 (65.2)</td>
<td>3 (16.7)</td>
<td>28 (50.0)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>15 (100.0)</td>
<td>23 (100.0)</td>
<td>18 (100.0)</td>
<td>56 (100.0)</td>
</tr>
<tr>
<td>No</td>
<td>Normal</td>
<td>2 (3.5)</td>
<td>9 (23.1)</td>
<td>25 (49.0)</td>
<td>36 (24.5)</td>
</tr>
<tr>
<td></td>
<td>Overweight</td>
<td>13 (22.8)</td>
<td>3 (7.7)</td>
<td>1 (2.0)</td>
<td>17 (11.6)</td>
</tr>
<tr>
<td></td>
<td>Obese</td>
<td>42 (73.7)</td>
<td>27 (69.2)</td>
<td>25 (49.0)</td>
<td>94 (63.9)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>57 (100.0)</td>
<td>39 (100.0)</td>
<td>51 (100.0)</td>
<td>147 (100.0)</td>
</tr>
</tbody>
</table>

Chi-square test: \( P < 0.01 \) for body size perception in relation to weight categories. IOTF, International Obesity Task Force.
the present study took place, extra weight is considered by some as a sign of robustness and strength [27, 28]. For this reason, body size perceptions of Cree children would potentially be developed in a cultural context where larger body sizes are preferred. It may be that Cree children in Quebec are raised to be more tolerant of larger body sizes, to desire a large body size or consider larger body sizes to be ‘normal’ given the prevalence of obesity among both adults and children in the communities.

It is possible that some Cree children who responded that their body size was too big may have been concerned about their appearance based on media exposure rather than their risk for diabetes. Even in remote areas of Canada and the United States, children receive messages from the mainstream North American society through forms of mass media including satellite television that can influence their beliefs and attitudes about a healthy or acceptable body size [13, 29, 30]. Children who are unhappy with their appearance whether due to weight-related social pressures or personal weight concerns may be prone to disordered eating and be less likely to adopt health behaviors than children who have a positive sense of their bodies [8].

**Strengths and limitations**

A strength of the current study is that children were classified into weight categories using measured rather than self-reported heights and weights thereby reducing reporting bias [31]. Another strength was the use of ethically appropriate drawings that likely allowed children to identify with the figures and choose the best response to the questions about diabetes risk. A shortcoming of this study and other similar studies among First Nations and American Indian children was that qualitative methods were not employed to confirm meanings that children inferred when responding to the questions about diabetes and body size acceptance, as has been done in some studies with First Nations and Native American Indian adults [26–28, 32, 33].

**Implications for diabetes health education intervention research**

Psychosocial considerations and positive body image development might be an aspect of interventions to promote diabetes awareness and healthy body weights and body weight perceptions in Cree children. To develop interventions, future studies are required to understand where and how Cree children acquire their knowledge of diabetes and healthy body sizes, the forms of teachings and activities that would best increase diabetes awareness, and if children with diabetes awareness are more likely to make positive lifestyle behavior changes. Although there have been at least two large-scale community-based diabetes prevention programs for First Nations schoolchildren in Canada that included instruction on type 2 diabetes [34, 35], there has been no formal evaluation of whether diabetes instruction influenced children’s health behaviors. Qualitative studies with children, parents and teachers could help identify communication opportunities to promote healthful lifestyles for the prevention of obesity [36]. The home environment is important for shaping children’s behaviors and beliefs and requires more study in First Nations communities [37]. There would be value in understanding parents’ awareness of diabetes and in knowing if parents talk with their children about diabetes and help form children’s perceptions of a healthy and desirable body size.

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**Conflict of interest statement**

None declared.

**References**


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