Anthropometric correlates and underlying risk factors for type 2 diabetes mellitus among Inuit

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Outline

- Introduction
- Literature Review
- Purpose
- Methodology
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  - Study II: Pangnirtung Community
- Results
  - Study II
    - Anthropometric correlates of indices of insulin resistance
- Final Conclusion
Introduction

• Health promotion and intervention programs are important for the well-being of northern communities

• Surveillance data
Literature Review
### Prevalence of Type 2 DM among Inuit

<table>
<thead>
<tr>
<th>Reference</th>
<th>Indigenous Group</th>
<th>Year/Period</th>
<th>Prevalence per 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scott et al, 1957</td>
<td>Alaskan Eskimos</td>
<td>1957</td>
<td>0.8-1.4</td>
</tr>
<tr>
<td>Schraer et al, 1997</td>
<td>Alaskan Eskimos</td>
<td>1993</td>
<td>21.9</td>
</tr>
<tr>
<td>Bjerregaard, 2003</td>
<td>Greenlanders</td>
<td>1962</td>
<td>0.5</td>
</tr>
<tr>
<td>Bjerregaard, 2003</td>
<td>Greenlanders</td>
<td>2001</td>
<td>108 men 88 women</td>
</tr>
<tr>
<td>Young et al, 1990</td>
<td>Inuit (NWT)</td>
<td>1987</td>
<td>3.6</td>
</tr>
</tbody>
</table>
For example:

- Widely used BMI may overestimate the prevalence of overweight and obesity in Inuit populations.
- May not be as predictive of type 2 DM risk among Inuit.
Anthropometric indicators and indices of insulin sensitivity

- Obesity is known to be a major risk factor for insulin resistance

  - ↓ insulin sensitivity
    - common defect underlying type 2 DM and IGT

- Gold standard for measuring tissue insulin sensitivity
  - Euglycemic hyperinsulinemic clamp

- Simpler, non-invasive methods
  - Equations to provide estimates of insulin action
Purpose

- Anthropometric descriptive overview
- BMI and BMI adjusted for sitting height
- Association of anthropometric measures with risk factors for type 2 DM among Inuit
Data was obtained from 2 studies
Study 1: Nunavik Health Survey
Qanuippitaa? How are we?

Comparisons of obesity measures
among Inuit of Nunavik

Photo: Isabelle Dubois (NRBHSS).

August 28-Oct 1, 2004
Study 2: Pangnirtung Pilot Health Screening

May 2005

Photo: Guylaine Charbonneau
Participatory process

- Community steering committee
- Community research assistants
**Inclusion Criteria**

- **Nunavik**
  - 18-74 year
  - Inuit (self reported)
  - Randomly selected households
  - **Total sample size:** 489 (220 M, 269 F)

- **Baffin Community**
  - ≥ 18 years
  - Inuit (self reported)
  - Volunteers
  - Diabetics excluded
  - **Total sample size:** 48 (11 M, 37 F)
Methodology

DATA

Clinical and laboratory measurements

LEGEND

Baffin

Nunavik

Photos: Isabelle Dubois (NRBHSS).
Anthropometric Measure: Sitting Height

Photo: Isabelle Dubois (NRBHSS).
Sitting Height: Inuit Specific Context

- Sitting height
  - Calculation of sitting height-to-stature ratio (SH/S)

- SH/S ratio
  - To correct the observed BMI
  - May be necessary to provide an Inuit specific context for determining risk factors related to DM and CVD.
Example

A woman has a $\text{BMI}_{ob}$ of 27.0 kg m$^{-2}$ and a SH/S ratio of 54%.

- The $\text{BMI}_{0.52} = 1.19 \times 52 - 40.34 = 21.54$.
- The $\text{BMI}_{es} = 1.19 \times 54 - 40.34 = 23.92$.
- Therefore the $\text{BMI}_{std} = 21.54 + (27.0 - 23.92) = 24.62$ kg m$^{-2}$. 
Expected Results Study 1: Comparisons of obesity measures among Inuit of Nunavik

Photo: Isabelle Dubois (NRBHSS).
Expected results

- Percent obese according to different anthropometric variables.
- Agreement between anthropometric obesity measures.
Results Study 2:
Anthropometric correlates of indices of insulin resistance from the Pangnirtung Health Screening

Photo: Daneen Denomme
### Obesity : Study 2

Percent obese according to different anthropometric variables.

<table>
<thead>
<tr>
<th></th>
<th>Female (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMlob</td>
<td>67.6</td>
</tr>
<tr>
<td>BMIstd</td>
<td>43.2</td>
</tr>
<tr>
<td>WC</td>
<td>86.1</td>
</tr>
<tr>
<td>%BF</td>
<td>64.9</td>
</tr>
</tbody>
</table>
### Laboratory results - Women

Insulin, glucose and insulin sensitivity in subgroups by obesity (mean (SD)).

<table>
<thead>
<tr>
<th></th>
<th>BMI†</th>
<th>Waist‡</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal n=12</td>
<td>Obese BMlob n=25</td>
</tr>
<tr>
<td>Insulin, fasting (pmol/l)</td>
<td>72.4 (31.1)</td>
<td>120.0*** (40.7)</td>
</tr>
<tr>
<td>Insulin, 2hr (pmol/l)</td>
<td>118.0 (74.4)</td>
<td>268.0* (237.0)</td>
</tr>
</tbody>
</table>

*Significant at \( p \leq 0.05 \), **significant at \( p \leq 0.01 \), ***significant at \( p \leq 0.001 \)
Age-adjusted linear regression coefficients of WC for predicting $I_R_{HOMA}$

$y = -3.874 + 0.066x$, $R^2 = 0.397$, $p = 0.000$
Final Conclusion

- BMIstd
  - useful perspective when comparing obesity patterns between populations

- Increasing obesity
  - health consequences

- Importance of health surveillance research and health promotion efforts

- Larger and heterogenous sample
Significance

• Additional health screenings and research

• Screening protocols and prevention efforts

Photo: Guylaine Charbonneau.
Thank You!

Photo: Guylaine Charbonneau