Nutrition implication of obesity and Type II Diabetes

Nutritional management of obesity & type 2 diabetes

Luiza Kent-Smith
NUTRITIONAL MANAGEMENT OF OBESITY & TYPE 2 DIABETES

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Learning Objectives

- Practical aspects in the nutritional management of:
  - Obesity
  - Type 2 Diabetes Mellitus (T2 DM)

- Enteral Nutrition Support
  - Adjusting requirements
  - Product selection
Underlying causes of Obesity

Energy Dense Foods

Together with genetic and metabolic characteristics
“SUPER SIZING”....
Why is it so difficult to lose weight?

- Evolution...animal’s body weights fluctuate
- **Stable body weight** – what would be the benefits?
- We are programmed to over consume
- **Food tastes good we override control mechanisms**

Unfortunately no **BIG FAMINE** recently!!!
## Obesity and Health Risks

<table>
<thead>
<tr>
<th>BMI (kg/m²)</th>
<th>Classification</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18.5</td>
<td>Underweight</td>
<td><strong>Increased</strong></td>
</tr>
<tr>
<td>18.5-24.9</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>25.0-29.9</td>
<td>Overweight</td>
<td><strong>Increased</strong></td>
</tr>
<tr>
<td>30.0-34.9</td>
<td>Obese I</td>
<td>High</td>
</tr>
<tr>
<td>35.0-39.9</td>
<td>Obese II</td>
<td>Very high</td>
</tr>
<tr>
<td>≥40</td>
<td>Obese III</td>
<td>Extremely high</td>
</tr>
</tbody>
</table>

Obes Res 1998, 6 (suppl 2)
Obesity Health Risks

- Type 2 Diabetes
- Hypertension
- Stroke
- Gallbladder disease
- Renal failure
- Heart failure
- Atherosclerosis
- Cancer

Social & Economic Costs...
Healthcare Insurances

CMAJ 1999; 160:483-8
Nutritional Management of Obesity

Generic Approach

- Nutritional assessment
- Devise an intervention strategy
- Discuss with patient/client
- Establish realistic goals... not immediate
- Reach an agreement
- Follow up and reassess

From the Algorithm for the assessment and stepwise management of the overweight or obese adult
Lau, D. C.W. et al. CMAJ 2007;176:S1-S13
Nutritional assessment

- Diet History
- Height
- Weight
  - 20% above IBW (Metropolitan Life)
- BMI (kg/m²)
- Circumferences
  - Waist
  - Waist/hip ratio
- Skinfolds
- Body fat cell distribution
  - Central
  - Peripheral
- Body Composition
  - BIA
  - DEXA – gold standard

CMAJ 2007;176:S1-S13
Circumferences – Good indicators risk

- Waist/ Hip Ratio (W/H)
- Visceral obesity (abdominal/peripheral)

**Males**
- W/H > 0.9
- Waist > 102 cm

**Females**
- W/H > 0.85
- Waist > 88 cm

Diets and Obesity

- Low fat; Very low carbohydrates
- “Fashion” diets
  - Atkins
  - South beach
  - Pritkin & many more
- Fad diets
  - Grapefruit
  - Astronauts

The bottom line is .... DIETS DON’T WORK

Satiety due to high protein
Short term good results
Long term no different

(Lancet. 2004 Sep 4-10;364(9437):897-9)
**Diet Regimes**

- **Low Calorie Diets**
  - (-) 500 to 1000 Kcal daily requirements
    - Initially (-) 10% wt
    - After 1y 33% of the wt loss recovered
    - 5y later back to initial wt...

- **Meal Replacements**
  - 200-300 Kcal
    - High satiety (Protein + fibre)

- **Very Low Calorie Diets**
  - \( \leq 800 \) Kcal/dia (protein & carbohydrates)
    - Rapid wt loss – reverted when intake increases
Why Diets Don’t Work

1. Regaining Wt among “dieters” is the norm not the exception
   i. **Lower BMR – easier to put on weight**
      (J Nutr 2005 Jun; 135(6):1347-52)
2. No one can live on a “Diet” forever
3. We are in daily contact with food
4. Need lifestyle strategies
5. **Food behaviour modification**
6. Coping strategies
7. Personal responsibility

Diet – from the Greek “Diaita” (Way of Life)
## Deciding on Treatment

<table>
<thead>
<tr>
<th>BMI Category (kg/m²)</th>
<th>25-27.9</th>
<th>27-29.9</th>
<th>30-34.9</th>
<th>35-39.9</th>
<th>≥40</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lifestyle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-morbidities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-morbidities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Obesity Treatment Pyramid

Lifestyle Changes

Physical activity

Healthy Eating

Medication
Nutrition Intervention

- What will work long term?
  - Wt loss 5-10%/wk
  - Wt loss 0.5-1.5 kg/wk

- Some long term energy restriction is inevitable
  - 1200 to 1800 Kcal

- Regular Physical Activity

- Healthy eating
  - Low fat (foods and cooking)
  - High carbohydrates (low refined)
  - High protein (not liquid)
  - High fiber
  - Indulge in low energy dense foods

Energy dense foods

Baked Potato – 100g
Calories – 93
Fat (g) – 0

Fries – 100g
Calories – 253
Fat (g) – 11 (7-15)

Chips – 100g
Calories – 533
Fat (g) – 36

36g oil
Nutrition Intervention

Key to **long term** success

- Self monitoring – taking responsibility
- **Maintain low fat diet (↓energy dense foods)**
- Serious Physical activity 1 hour/day
- **Always eat breakfast**

## Metabolic Syndrome

Co-occurrence of hypertension, some degree of glucose intolerance, high triglyceride levels and low HDL lipoprotein

<table>
<thead>
<tr>
<th>Risk Factor Components</th>
<th>Cutpoints for abnormality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight/obesity</td>
<td>BMI ≥ 25 kg/m²</td>
</tr>
<tr>
<td>Elevated triglycerides</td>
<td>≥150 mg/dL (1.7 mmol/L)</td>
</tr>
<tr>
<td>Low HDL cholesterol</td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>&lt;40 mg/dL (1.0 mmol/L)</td>
</tr>
<tr>
<td>Women</td>
<td>&lt;50 mg/dL (1.3 mmol/L)</td>
</tr>
<tr>
<td>Elevated blood pressure</td>
<td>≥130/85 mm Hg</td>
</tr>
<tr>
<td>2-Hour postglucose challenge</td>
<td>&gt;140 mg/dL</td>
</tr>
<tr>
<td>Fasting glucose</td>
<td>Between 110 and 126 mg/dL</td>
</tr>
<tr>
<td>Other risk factors</td>
<td>Family history of type 2 diabetes, hypertension, or CVD, polycystic ovary syndrome, sedentary lifestyle, advancing age, ethnic groups having high risk for type 2 diabetes or CVD</td>
</tr>
</tbody>
</table>
Prevalence of Metabolic Syndrome by Age (NHANES III)

<table>
<thead>
<tr>
<th>Age, years</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>40-49</td>
<td>20%</td>
<td>10%</td>
</tr>
<tr>
<td>50-59</td>
<td>40%</td>
<td>30%</td>
</tr>
<tr>
<td>60-69</td>
<td>50%</td>
<td>40%</td>
</tr>
<tr>
<td>≥70</td>
<td>50%</td>
<td>40%</td>
</tr>
</tbody>
</table>

JAMA.2002;287:356-359
IGT & T2 DM – by 500,000 inhabitants
Obesity and T2 DM

What do they have in common?

- Both chronic conditions
- Very related – most T2 DM are overweight/obese
- Together symbolize the Metabolic Syndrome

T2 DM – is a non-insulin dependent diabetes, characterized by insulin resistance/deficiency and hyperglycemia that clearly responds to Wt loss, healthy eating and exercise
Some Statistics... in Europe

- Type 2 DM – 22.5 million (5% population)
- 2025 – (+ 6 million)
- Type 2 DM responsible for 10-15% of Healthcare budgets
- IGT – impaired glucose tolerance affects 65 million Europeans (1/7)
  - Normal fasting glucose
  - Post-meal glucose elevated
  - >50% risk CVD
T2 DM Therapeutic Goals

- Control hyperglycemia/Avoid hypoglycemia
  - Monitor glucose levels and Hgb A1C
- Reduce the risk of long term complications
- Patient in agreement with Treatment Plan
- Patient follows Treatment Plan
  - Carbohydrate Counting
  - Regular exercise
# Let’s Carb Count

<table>
<thead>
<tr>
<th>FOOD</th>
<th>PORTION SIZE</th>
<th>GRAMS OF CARBOHYDRATE</th>
<th>CARBOHYDRATE CHOICES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Example – Sandwich Lunch</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread, whole wheat*</td>
<td>2 slices</td>
<td>30 g</td>
<td>2</td>
</tr>
<tr>
<td>Chicken breast</td>
<td>2 oz/60 g</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Margarine</td>
<td>1 tsp/5 mL</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Carrot sticks*</td>
<td>½ cup/125 mL</td>
<td>15 g</td>
<td>1</td>
</tr>
<tr>
<td>Green grapes*</td>
<td>½ cup/125 mL</td>
<td>15 g</td>
<td>1</td>
</tr>
<tr>
<td>Milk*</td>
<td>1 cup/250 mL</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tea/coffee</td>
<td>1 cup/250 mL</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>60 g</strong></td>
<td><strong>4 Choices</strong></td>
<td></td>
</tr>
</tbody>
</table>

What did you eat and drink?

Total:

---

*taken from the *Beyond the Basics* resources 2005

For more information on labelling, carbohydrate counting and fibre, please visit the Canadian Diabetes Association website, [www.diabetes.ca](http://www.diabetes.ca).

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Evidence – Life Style changes & Outcomes

- National Weight Control Registry. (Wing et al, Annu Rev Nutr 21:323-341, 321; 3000 patients with sustained wt loss >5 years

- 800 patients with average loss of 30 Kg. (Klem et al, Am J Clin Nutr 66:239-246, 1997); Maintain wt loss ≤14Kg for 5 years

- Diabetes Prevention Program (DPP). (Diabetes Care 22:623-634, 1999; DPP) ; (-) 7% wt in 1st year, (-) 5% wt loss after 3 years

- Diabetes Intervention Study. (Hanefeld et al, Diabetes Care 14:308-317, 1991) Diabetes Care; (-) 9 Kg for 6 years
Lifestyle Changes that work

- Reducing fat intake
  - Fat intake associated with ↑ fat mass & BMI
  - Reduction in fat intake → (-) 3 Kg

- Regular Physical Activity
  - Increases insulin sensitivity
  - Reduces hyperglycemia
  - Better lipid profile
Enteral Nutrition

- Requirements of obese patients
- Products and monitoring
- Diabetics
  - Products and monitoring
Adjusted IBW for Obese/T2 DM

- Don’t “feed” adipose tissue if person is overweight/obese; but don’t want even this type of patient to lose weight

- Use **Adjusted Ideal Body Weight in HBE** to estimate energy needs:

  - **AIBW** = (Actual Wt – IBW) x 0.25 + IBW

- Use AIBW if pt > 120% IBW; if pt 91 to 119% IBW, use actual/ideal wt

HBE – Harris Benedict Equation
Enteral Formulas

- Diabetes – two main approaches:
  - Those who defend “diabetic” formulas
  - Those who choose to use regular formulas

- Obesity – no specific formulas:
  - May benefit from using “diabetic” formulas
Evidence


Chronic Disease Management Approach

Obesity and Type 2 DM

1. Some genetic involvement but largely behavioral and environmental
2. Focus on outpatient treatment
3. Personal responsibility – consequences
4. Voluntary approach to treatment
   i. Client registers for classes, workshops
   ii. Emphasis on group therapy
   iii. “Continuing Education”

Saskatoon Health Region
Clinical Nutrition Services
Conclusion

“There is nothing wrong with our metabolism... the problem is the environment and the fact that food is no longer a survival issue but mostly a source of pleasure”...

Luiza Kent-Smith, 2007