How to Prevent and Treat Type II Diabetes with Nutrition

Presented by Schuyler Distelzweig
WSU CPD Student
What are we going to cover today?

- By the Numbers
- Types, Symptoms, Complications
- Diabetes Management
- If You are Diagnosed
- How to Prevent Diabetes
- Emerging Research

What is Diabetes?
Main Characteristics

- Caused by impaired carbohydrate metabolism
  - Either insulin resistant or don’t produce enough
  - Leads to elevated blood glucose levels (hyperglycemia)

Symptoms

- Polyuria (excessive urination)
- Polydipsia (excessive thirst)
- Unexplained weight loss
- Dehydration and electrolyte disturbances
- Ketoacidosis
- Hyperglycemia
By the Numbers

- 34.2 million people have diabetes (10.5% of the US population)
- 7.3 million people (21.4% are undiagnosed)
- 88 million people aged 18 years or older have prediabetes (34.5% of the adult US population)
- In 2016, one in 10 Michigan adults 18 years and older were diagnosed with diabetes - 870,000 people
Types of Diabetes
Type I

- Autoimmune Disease - Antibodies attack islet cells in the pancreas that produce insulin
- Usually diagnosed early in life, can be diagnosed as late 30
- Requires exogenous insulin
- Genetic component
- Rare - roughly 10% of new cases¹

Type II

- Onset is typically later (Previously called adult onset)
- Can go undiagnosed for a long time without being life threatening
- Highly associated with obesity
- Insulin Receptor Defects
- Environmental factors responsible for onset however genetics play a big role as well
Complications of Diabetes

➢ Short Term (acute)

- Diabetic Coma
  - Diabetic Ketoacidosis
  - Hyperosmolar Hyperglycemic Syndrome
- Hypoglycemia
  - Most frequent comp. In type I and can occur in type II
  - Caused by disease mismanagement (eg. Excessive insulin or drugs, skipped meals, alcohol etc).
Complications of Diabetes Cont.

➢ Long Term (chronic)

- Main cause is Advanced Glycation End Products
  - Stimulate pathways that are damaging to tissues
- Sorbitol build up causes cellular injury

- Macrovascular
  - Accelerates atherosclerosis
  - Increased risk for cardiovascular disease due to high blood pressure, blood lipid abnormalities - leading cause of death

- Microvascular
  - Retinopathy may occur in up to 80% of patients
  - Nephropathy due to damage to the capillaries in the kidneys

- Neuropathy
  - Peripheral (limbs/extremities)
  - Autonomic (erectile dysfunction, gastroparesis, cardiac arrhythmias)
Diabetes Prevention
Prevention of Type II Diabetes

- Prediabetes or "increased risk for diabetes" (IRD) affects approximately 37% of US adults and 23% of adolescents¹
- Prediabetes diagnostics: Fasting Plasma Glucose of 100-125 mg/dl, A1C 5.7-6.4%

Pillars of Diabetes Prevention
- Weight Management
- Dietary Modification
- Physical Activity
- Monitoring for Diabetes
  - Should be tested yearly and given additional counseling if necessary
Weight Management

- Weight loss of 2-8 kg or 7% of total weight improves risk in overweight and obese individuals.

- Weight loss must be sustainable
  - \( \frac{1}{2} - 1 \text{ lb per week} \)
  - Risks of weight cycling

- Monitoring weight should begin in adolescence - consult a pediatric dietitian if possible

- All at risk patients should consult a dietitian or weight loss professional if possible
Weight Management Cont.

- Losing weight on your own
  - Calculate your energy needs and eat at a 250-500 calorie deficit
  - ½ - 1lb per week is healthy and sustainable
  - [Mifflin St. Jeor Calculator - Find Your Daily Caloric Burn Here](#)

- Use an app such as MyFitnessPal so you can easily add meals and track your calories
Dietary Modification

- Increase your intake of whole grains, nuts/seeds, and fruits/vegetables
  - Try oatmeal for breakfast - lowers LDL chol. can reduce risk of cardiovascular disease⁵
  - Make smoothies

- Limit added sugar
  - Sweetened beverages etc.

- Try to limit fat
  - Don’t avoid but don’t eat in excess eg. fast food

- Eat at consistent times and avoid snacking
Active Lifestyle

► Try to aim for 150 minutes of moderate physical activity per week
  • Equivalent to 30 minutes, 5 days/week

► Do something active that you enjoy
  • Sport or other rec. Activity
  • Have a workout partner

► For individuals who don't want to track calories, exercise combined with dietary modification helps aid in losing and maintaining a healthy weight and reducing risk
Diabetes Management
Nutrition Management of Diabetes

- An individualized sustainable diet plan is key to good long-term outcomes
- Regular follow up every 3 months with a dietitian has been shown to increase adherence, leads to an average drop in A1c of 1-2%, and leads to better health outcomes

Nutrition Intervention

❖ Promotes Healthful Eating Patterns
  • To achieve bodyweight, glycemic, blood pressure, and lipid goals
  • Delay/prevent complications
❖ Provides Individuals With Tools For Meal Planning
  • Rather than focusing on individual nutrients
❖ Maintain Consistent BGL
  • Consistency in intake in type II, and insulin regimen to match intake in type I
How To Improve Your Diet: Macronutrients

Carbohydrates
- Spread out your intake
- Focus on complex carbohydrates
- Make sure to eat your fiber
- Use a strategy such as carbohydrate counting when planning your meals
- Limit added sugar to 10% and don’t cut out natural sugar

Fat
- 20-35% of calories from fat for cardiovascular pro.⁷
- Increase mono and poly-unsaturated fat
- Nuts, vegetable oil etc.
- Reduce saturated fat
- Cut out trans-fat completely if possible

Protein
- Meet standard protein requirements
- Focus on lean sources of protein and vary between sources
- Some healthy examples: salmon, nuts, kidney beans, chicken etc.
Carbohydrate Counting

► Easiest method to teach for practical meal planning
  • May not be appropriate for all cases
  • Type I or other cases where blood glucose level needs to be tightly controlled

► Based on carbohydrate choices
  • Each choice is a 15g serving
  • Patient chooses options based on preference and eat them evenly throughout the day

► Patient is then taught to measure their own portions or use a food list
  • Carbohydrate Choice Lists (cdc.gov)
Carbohydrate Counting Example

► First the amount of total carbs is calculated
  • 2000 kcal / 50% carb. Diet = 1000 kcal
  • 1000 kcal carb. / 4 kcal per gram = ~250 g carb divided into ~16 carb. choices

► The carb. Choices should be spread evenly with the goal of BGL control
  • Considerations for type I
  • Patient chooses options based on preference and eat them evenly throughout the day

► Patient is then taught to measure their own portions or use a food list
  • Carbohydrate Choice Lists (cdc.gov)

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**TABLE 26-5 Sample Carbohydrate Distribution for a 2000-kCalorie Diet**

<table>
<thead>
<tr>
<th>Meals</th>
<th>Carbohydrate Allowance</th>
<th>Portions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grams</td>
<td></td>
</tr>
<tr>
<td>Breakfast</td>
<td>60</td>
<td>4</td>
</tr>
<tr>
<td>Lunch</td>
<td>60</td>
<td>4</td>
</tr>
<tr>
<td>Afternoon snack</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>Dinner</td>
<td>75</td>
<td>5</td>
</tr>
<tr>
<td>Evening snack</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>255 g</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

Note: The carbohydrate allowance in this example is approximately 50% of total calories.
1 portion = 15 g carbohydrate = 1 portion of starchy food, milk, or fruit.
Example Planning
Breakfast

► Using our previous example we have 16 total choices, what do we want to eat for breakfast?

► We want a bowl of cereal with blueberries and half a bagel

► Check our food list
  • Carbohydrate Choice Lists (cdc.gov)

► This will use 4 choices; we have 12 left to spread throughout the day
Making Your Own Food List

1. Check the serving size

2. Find the number of grams of carbohydrate

1. Subtract fiber from grams of carbohydrate

1. Divide the total grams of carbohydrate by 15 to find the number of choices per serving.
   
   \[
   \frac{26g - 0g}{15g\text{ per choice}} = \approx 2\text{ choices}
   \]
May be easier and is great for those with diabetes and prediabetes

Include

- ½ plate non-starchy vegetables - eg. leafy greens, broccoli, cauliflower, carrots, zucchini, cucumber, etc.
- ¼ plate complex carbohydrates - eg. sweet potatoes, whole grains
- ¼ protein foods - eg. salmon, ground turkey
Probiotics and Prebiotics

Probiotics

► Microorganisms that are beneficial to gut health

► Review of randomized controlled trials using supplementation improved blood glucose control⁸

► You can find probiotic supplements or get them from foods like yogurt, sauerkraut, kimchi, or kombucha

Prebiotics

► Food ingredients that are non-digestible and promote the growth of good gut bacteria

► Research suggests that they improve metabolic and inflammatory markers and may improve glycemia⁹

► Foods containing: Cereal bran, bananas, garlic, high fiber foods
High Protein Diets

- Several studies indicate that high protein diets may be superior for weight loss, glycemic control, and cardiovascular disease risk in patients with type II.

- All the diets in these studies utilized calorie restriction and most moderately restricted fat.

- Focus on lean, healthy protein sources like fish and beans for best cardio protection.
In Summary
In Summary

► Find a way to lose and maintain a healthy weight
► Try to make healthy changes to your diet overall
  • Healthy fats - Nuts/seeds, avoid trans-fat, limit saturated fat
  • Lean healthy protein - Fish, beans, lean meat
  • Consistent carb intake - even intake, limit added sugar, complex carbs
► If you have diabetes use a consistent method to meal plan eg., carb counting
► Stay physically active - find a way to make it enjoyable
► Try incorporating some new healthy foods into your diet eg., fermented foods
► If you are at risk for diabetes, make sure to get a checkup at least once a year

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Now offering telehealth visits through telephone or webcam!
References


- Maitra, The Endocrine System. 2015.


References

