Preventing the Effects of Metabolic Syndrome Associated with Type II Diabetes
Marissa Anderson
Department of Integrated Science

Introduction

Type II diabetes mellitus is growing at alarming rates in our society and has become increasingly frequent among children and adults (Pollan, 2006). Metabolic syndrome is considered a predictor of Type II diabetes because it is a cluster of cardiovascular risk factors that are shown to act together to increase the risk of adverse cardiovascular events (“Metabolic Syndrome”). There are many interventions that have been studied over the years to prevent this disease which include weight loss, diet, physical exercise, medication, and insulin therapy. This study will show that diet and physical exercise will be the most effective in preventing the effects of Type II diabetes and chances of developing metabolic syndrome. How can children and adults decrease their risks of developing metabolic syndrome? If individuals were to follow one of the many interventions, such as diet and physical exercise, which would be the best method to prevent metabolic syndrome? How can children and adults with Type II diabetes prevent the effects or chances of developing metabolic syndrome?

Background Information

Diabetes is a medical condition that involves an excessive amount of glucose moving throughout the bloodstream. Insulin is a natural hormone that is produced by the pancreas which is then released into the bloodstream. Insulin lowers the amount of sugar that is circulating throughout the bloodstream. Once the amount of sugar is lowered in the blood, the amount of insulin that is released by the pancreas is also decreased. Insulin resistance occurs when glucose in the bloodstream doesn’t allow the cells to use the sugar for energy. Overtime, the pancreas isn’t able to release insulin as efficiently, leading to developing Type II diabetes. The most common symptoms of Type II diabetes are extreme thirst, fatigue, weight loss, fast breathing, and frequent urination. Metabolic syndrome serves as a predictor for developing Type II diabetes because it is a combination of conditions, such as increased blood pressure, overweight, and increased blood glucose levels that increases the risk of developing Type II diabetes and heart disease.

Diabetes Epidemic

Currently in the United States:
- 30.3 million people diagnosed with diabetes (9% of population)
- 1.5 million people diagnosed every year making diabetes the 7th leading cause of death

Worldwide:
- As of 2014, 8.5% of people worldwide have diabetes
- The prevalence of diabetes has nearly doubled since 1980

Abutair Research Study

Abutair Study was performed to determine whether soluble fiber supplementation from psyllium improves glycemic control indicators and body weight in Type II diabetes patients.
- 20 participants with Type II diabetes consumed 10.5 g of soluble fiber a day
- The control group consisted of 20 participants who also had Type II diabetes but continued on their regular diet for the 8 weeks of the study
- After 8 weeks of intervention, soluble fiber supplementation showed significant reduction in the intervention group’s body mass index (BMI)
- Participants consuming more than 26 g of fiber a day had a lower risk of developing Type II diabetes than those who consumed less than 26 g of fiber a day by about 18%

Table I: Differences in glycemic control indicators in the control and intervention groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>Glucose</th>
<th>Insulin</th>
<th>Body Mass Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>100</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>Intervention</td>
<td>90</td>
<td>40</td>
<td>20</td>
</tr>
</tbody>
</table>

Nilson Vegard Research Study

Nilson Vegard Study was performed to assess the health-related quality of life (HRQOL) of people at risk of Type II diabetes undergoing lifestyle intervention and the predictors for improved HRQOL.
- Low-intensity interventions with an 18 month follow up
- 213 participants: 50% were women with a mean age of 46 years and a mean body mass index (BMI) of 37
- 1 in 3 individuals achieved a moderate or large clinical improvement in HRQOL

Figure I: Changes in the physical component summary (PCS) and mental component summary (MCS) scores associated with achieving or not achieving the combined lifestyle change of weight loss and improved exercise capacity.

Table: Mean changes in physical and mental HRQOL summary scores.

<table>
<thead>
<tr>
<th>Group</th>
<th>PCS</th>
<th>MCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Intervention</td>
<td>60</td>
<td>60</td>
</tr>
</tbody>
</table>

Analysis

Children and adults with Type II diabetes can prevent the effects or chances of developing metabolic syndrome through the most common intervention of diet and physical exercise.

Abutair Study:
- A strict diet of incorporating fiber, without large amounts of sugars and starches resulted in weight loss
- According to Table I, reduction in glycemic response was enhanced by adding soluble fiber to the normal diet
- Consuming foods that contain soluble fibers can improve glucose metabolism more in Type II diabetes patients
- The study concluded that the best diet for those with diabetes is a healthy diet consisting of fibers found in fruits and vegetables

Nilson Vegard Study:
- Outlined the effects that diet and physical exercise had for those with Type II diabetes
- In Figure I, the PCS scores show a clinically significant lifestyle change, while the MCS scores show no clinically significant lifestyle change
- The results of the Nilson Vegard study concluded that diet and physical exercise are one of the best combined interventions that can reduce the risk of developing Type II diabetes and lessen the effects of the illness if one is already diagnosed with the disease

Conclusion

Type II diabetic patients who watched the types of foods they consumed and exercised had a reduction in their glucose levels. Eating non-starchy vegetables and fruits as well as incorporating fibers into their diet helped patient’s glucose levels. Exercise consisting of cardio, such as walking or biking improved their aerobic capacity and lowered their glucose levels. There were two other types of interventions that were possible solutions to the problems diabetics face: medication and insulin therapy. These interventions were shown to be as beneficial since they would need the medication and insulin therapy for a long period of time to not develop metabolic syndrome that could lead to Type II diabetes. The patients could build up a tolerance to the medications and different types of insulin which doesn’t provide the promising benefits that diet, and exercise have on the effects of Type II diabetes

Bibliography


Type 2 Diabetes | Basics | CDC. Centers for Disease Control and Prevention, Centers for Disease Control and Prevention, www.cdc.gov/diabetes/basics/type2.html.