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The Influence of Hispanic Culture on Diabetes

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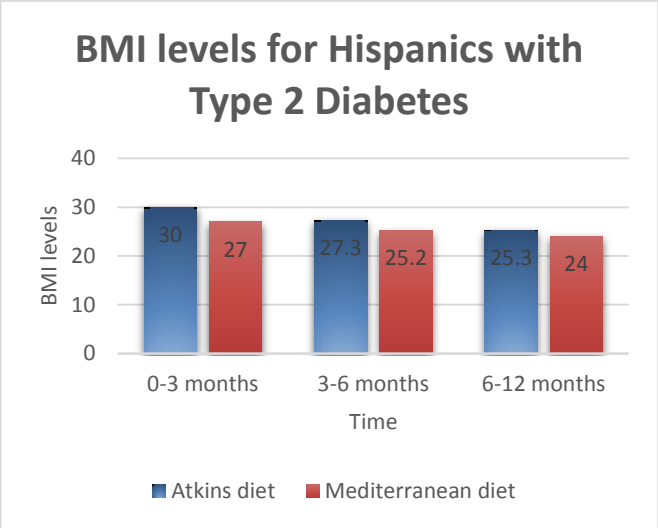
Graphical Abstract



Abstract

The purpose of this study was to compare the effects of a one-year intervention with a low-carb and low-fat diet on BMI, weight loss, and glycemic control in Hispanic patients with type 2 diabetes. Low-fat participants were given the Mediterranean diet, while the low-carb participants were given the Atkin's diet. A total of 60 randomized participants were assigned to a low-carb or a low-fat diet where they had to monitor their sugar levels and carbohydrate or fat intake. Before the study took place, each participant received nutritional education and tools, such as glucose monitors and a journal, to help them monitor their progress throughout the year. Every three months, health professionals interviewed each participant in order to keep track of their progress. When acquiring the results, the glucose, BMI, and cholesterol levels were measured and compared. Glucose, BMI, cholesterol levels and weight loss significantly decreased. However, the Mediterranean diet had better results than the Atkin's diet. In conclusion, the low-fat Mediterranean diet had the most significant findings.

Note: This paper was an assignment for a nursing school General Education Capstone course. The student writer did not conduct a real study; she rather simulated a study to demonstrate writing/research skills, creativity, scientific knowledge, and an understanding of how to generate and analyze data. The corresponding author is the student's instructor, who guided the student on each section of the scientific paper, providing feedback on how to "conduct" the study and on how to revise the writing.

Introduction

Literature Review: Scientific

Individuals diagnosed with diabetes have high glucose levels or blood sugar. The energy derived from glucose is essential for the body to function adequately. Glucose is the body's primary energy source (National Institutes of Health, 2017). However, an excess amount of glucose may cause complications. When the body develops insulin resistance, it becomes difficult for glucose to enter the cells in the body. Over time, the pancreas secretes more insulin to over-compensate the over-production of glucose, but it ends up failing because the amount of glucose becomes unbearable (National Institute of Diabetes and Digestive and Kidney Diseases, [NIDDK] 2016). Understanding insulin secretion at a cellular level is crucial to understand how the pancreas naturally secretes insulin in our bodies (Wilcox, 2005). Nutrient and non-nutrient secretagogues, such as glucose, trigger the b-cells to begin secretion of insulin by a rapid increase in intracellular ATP and closing of the K+ -ATP pump channels (Wilcox, 2005). Insulin is the most critical factor in metabolic processes, but hormones influence the action behind the role of insulin (Wilcox, 2005). Hormones such as catecholamines, glucagon, and glucocorticoids carry out metabolic processes (Wilcox, 2005). Extreme levels of secretion may influence insulin resistance; however, it does not represent the majority of insulin-related situations (Wilcox, 2005). Lack of insulin signals results in most cases of insulin-resistant (Wilcox, 2005). According to Bockhorst U, de fries D, although the brain is not insulin-dependent, it contains insulin receptors located in the hypothalamus, hippocampus, olfactory bulb and the cerebral cortex (as cited in Wilcox, 2005). According to Gerozissis, it is highly likely that the brain plays an essential role in the insulin resistance in type 2 diabetes (as cited in Gisela W., 2005).

There are two kinds of diabetes: type 1 and type 2. Type 1 diabetes is the deadliest form of the disease, due to severe insulin resistance in the body. The pancreas of type 1 diabetic patients is unable to produce any insulin, therefore making insulin required from outside sources. These individuals are diagnosed from a very early age, or before 30. Type 2 diabetes is the most common and is preventable since it occurs during later life periods ("Nobel Prize," 2009). During the 1920s, insulin was isolated and purified so that it could be injected to type 1 diabetic patients and it provided a remarkable solution that remains today ("Nobel Prize," 2009). In type 1 diabetes, beta cells attack the body ("Nobel Prize," 2009). There is still no scientific reason as to why the body decides to do this, but there are factors that may influence the likelihood for this to happen: a hereditary disposition or environmental influences, such as viral infections ("Nobel Prize," 2009). The environmental factors that can influence diabetes are lack of exercise, obesity, or even smoking or alcohol consumption (Rana, 2014). Although type 1 diabetes is incurable, due to the nonfunctional state of the pancreas, individuals may have a normal life with consistent insulin therapy, a healthy diet, and exercise ("Nobel Prize," 2009).

Type 2 diabetes is diagnosed more frequently than type 1 diabetes; beginning with insulin resistance ("Nobel Prize," 2009). Due to the body's inability to adhere to insulin signals, glucose is unable to enter the cell like it naturally should ("Nobel Prize," 2009). As a result, individuals with type 2 diabetes have to continually manage their sugar levels and maintain a clean diet and consistent exercise for their bodies to produce and use insulin correctly. Type 2 diabetes links to obesity, lack of physical activity, and unhealthy eating (Rana, 2014). Over time, diabetes can cause detrimental complications to the heart, kidneys, blood vessels, and nerves (Rana, 2014). These difficulties lead to risks of heart disease and stroke (Rana, S., 2014). Many people die due to heart complications associated with diabetes (Rana, S., 2014). This vast amount of information may make it seem complicated for individuals with diabetes to have a healthy life, but it is a lot simpler than it may look. The human body requires the right amount of fuel to function correctly. Diet plays a crucial role in maintaining glucose levels in a healthy state. High-fat foods have a strong influence in initiating insulin resistance- saturated fats and trans-fatty acids in particular. (Lichtenstein et al., 2000). Fatty acid compositions are said to play a crucial role in insulin resistance. (Wilcox, 2005). Insulin resistance causes an increase or decrease of inflammation, due to the composition of fatty acids in the body (Spears and Perry, 2015). The idea became evident over a century ago when anti-inflammatory drugs effectively reduced hyperglycemia in diabetic patients (Spears and Perry, 2015). Organs affected by fatty-acid mediated inflammation include the hypothalamus, liver, adipose tissue, skeletal muscle,

gastrointestinal tract, and pancreas (Spears and Perry, 2015). As said by JT, the hypothalamus, in particular, is inflamed due to excess calories or saturated fat, leading to the insulin and leptin resistance (as cited in Spears and Perry, 2015). The increase in hunger as a result of this, leads to excess calorie intakes, resulting in the excess release of fat into the bloodstream and other organs (Wilcox, 2005). According to Oh and Olefsky, omega-3 acids such as EPA and DHA can decrease inflammation within the hypothalamus (as cited in Spears and Perry., 2015). These anti-inflammatory fatty acids can be acquired naturally from foods like fish. Well-balanced diets aids in the decrease in inflammation from the organs affected by insulin resistance. It is critical for individuals to pay close attention to what they eat and what is in the foods they eat. The body's natural mechanism depends on functioning organ systems. The level at which it performs depends on how well we treat our bodies. Understanding how the body naturally works allows individuals to take care of themselves better for a healthy way of life. The levels of fat in a diet and composition of fatty acids can have a significant role in the moderation of insulin resistance (Wilcox, 2005). This information summarizes the cellular and molecular level of diabetes' role in the body. With a scientific background, one can grasp how to treat diabetes.

Literature Review: Cultural

Diabetes is one of many diseases related to metabolic disorders that derive from poor diet choices, resulting in elevated glucose levels. Studies show that Hispanics predominantly show high levels of pre-diabetes (Heuman. and Scholl, 2013). This growing ethnicity is at risk of developing diabetes. According to Rodriguez, between 1980 and 2005, the number of people with diabetes increased from 5.8 to 14.6 million (as cited in Heuman and Scholl, 2013). As said by Daniel, S. R., one in every three children in the United States will become diabetic during their lifetime (as cited in Heuman and Scholl, 2013). Due to the correlation between obesity and diabetes and the high numbers of diabetics in Hispanic populations, there is a high percentage of obese Hispanics who will develop diabetes at some point in their lives (Heuman and Scholl, 2013). It is imperative that individuals educate themselves and become more aware of the growing rates of diabetes, as it is an incurable disease and may lead to critical health conditions.

A study conducted by Heuman. and Scholl of Mexican-Americans, revealed the factors contributing to diabetes and how participants were affected by those factors. Participants reported the vulnerability to culturally influenced foods, amongst other factors, increasing the likelihood of them developing diabetes (Heuman and Scholl, 2013). Some of the participants confessed to not being preoccupied or worried about diabetes because they had no personal or family history of diabetes (Heuman and Scholl, 2013). Many participants spoke of diabetes as something "passed down" to them from their family members, and used that to justify why they and their future children would be at risk of being diabetic (Heuman and Scholl, 2013). Others spoke of the susceptibility to fast food advertisements and media. The media is continuously advertising non-nutritious food options for low prices, making individuals more likely to consume these unhealthy food choices (Heuman and Scholl, 2013). Others claimed to be ignorant to the nutrition of their refined foods, thinking that Mexicans were prone to diabetes regardless of what kind of foods they consumed (Heuman and Scholl, 2013). It is evident that diabetic management is lacking in Hispanic populations, therefore affecting the increasing rates of diabetes and other metabolic related diseases. Studies have shown just how closely related diet consumption and diabetes are.

Colin-Ramirez et al. read an issue of JADA that discussed two studies: one that examines blood pressure among students in Mexico City and the other explores the relationship between diet and obesity among Hispanic children in Houston, Texas (as cited in Rafaela, 2009). In the studies, they found that the quality and content is inferior, especially in low-income areas (Rafaela, 2009). Wilson et al. found that children, both overweight and non-overweight, followed a diet low in vegetables and fruits and excessively high in carbs, fats, and sugar levels (as cited in Rafaela, 2009). Wilson et al. studies revealed how Hispanics attempt to protect and continue to practice their valuable cultural traditions from being "washed out" through the process of acculturation (as cited in Rafaela, 2009). The authors also found that more significant than the quality of the diet was the number of calories that the children consumed (Rafaela, 2009). Acculturation plays a crucial role in what Latino immigrants

may struggle with once they are in the U.S. for the very first time and have to adapt to new cultural views and society.

As Hispanics adapt to the American culture or become more acculturated, they are adopting a new diet high in fats and sugar (Pablo J.C. and J. Camilo M., 2011). This food is what promotes health issues such as diabetes, cardiovascular disease, etc. (Pablo J.C. and J. Camilo., 2011). Acquiring a good education can aid in individuals being able to read and comprehend food labels, to live a healthier life (I. Chukweuke and Z. Cordero-MacIntyr, 2011). Also, making health care more accessible and having educated health care professionals can also influence the level of dietary intelligence for better diet choices among Hispanics.

Materials and Methods

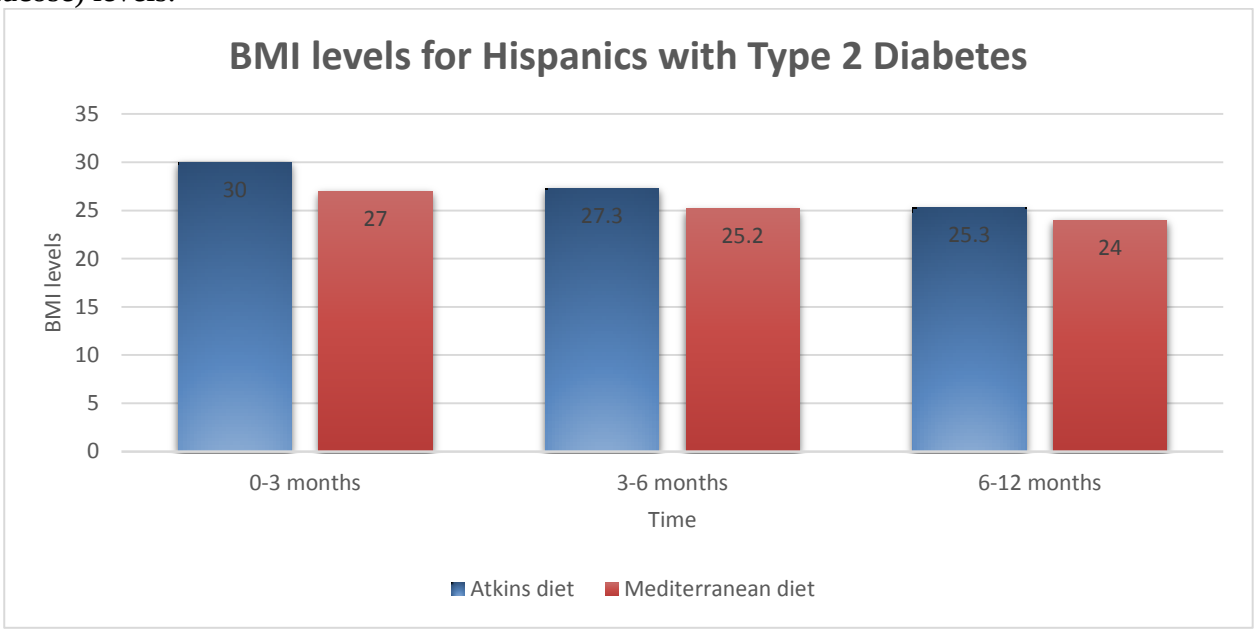
The study enrollment was held between September 2016 and December 2016. A total of 1,000 individuals applied to the recruitment, but only 160 were eligible after pre-randomization. To be qualified for the study, individuals conducting the investigation looked for: overweight Hispanic men and women, diagnosed with type 2 diabetes for at least one year, between the ages 30 and 60 and uneducated about diabetes management or diet plans. The conductors of the study also looked for participants with A1C levels between 6 and 11%, and a BMI more than or equal to 25 kg/m2. The 160 participants that met the criteria were pre-randomized with self-monitoring activities and diet management. These actions were designed to educate the participants on how to measure their blood sugar levels, weigh foods, and monitor their BMI level. After the pre-randomization, 30 participants chose to opt out of the events, and 30 dropped out of the study, leaving a total of 60 randomly assigned participants. Using a computer-generated randomization to divide the participants into equally distributed groups, 30 participants were randomly assigned to follow a Mediterranean diet (low-fat) or an Atkin's diet (low-carb). The Mediterranean diet is plant-based with olive oil as its primary source of fat. Diet includes plenty of vegetables, fruit, whole grains, cereals, nuts, seeds, and beans consumption. Anything seasonally fresh and locally grown can be consumed, as well. Some of the foods allowed in small amounts are dairy products, such as fish, yogurt, cheese, and poultry. Red meat is limited, as well as wine with meals (1-2 glasses per day). The Atkins-diet limits the number of carbohydrate consumption by restricting foods with sugar, grains, vegetable oils, trans fat, starches, and legumes. High-carbohydrate vegetables and fruits like carrots, bananas, apples, and grapes are to be eliminated or kept to a minimum as well.

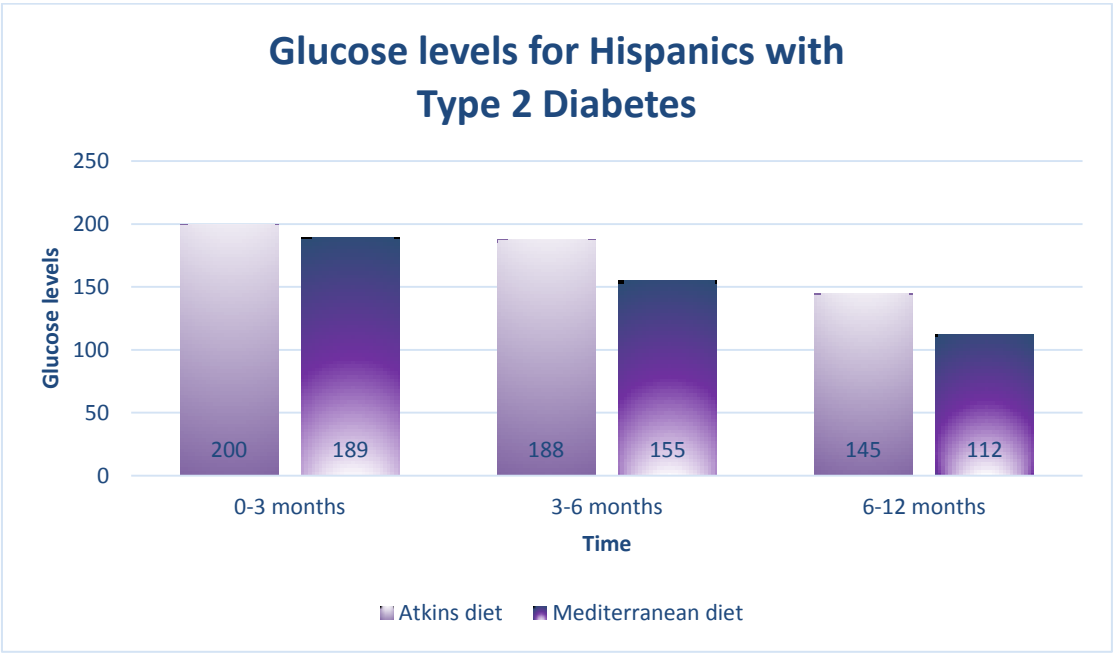
Each participant received a booklet that contained details of the menu they had to follow, conventional foods, and recipes. It also included self-monitoring tips for blood sugar, weight loss, and BMI levels. Also, we recommended participants to achieve about 160 min of physical activity a week, even though it would not be measured at the end of the study. At randomization, each participant received a personalized journal that had the specific gram allowance fit to their personal needs. The journal contained their starting BMI and glycemic levels, as well as a section for them to keep a daily log of their progress. In this section, they would individually record how many grams of food they consumed daily and were to continue doing so throughout the entire study. The participants were allowed to use the help menu and recipes for only the first month of the trial. The purpose of this was to familiarize the participants with the foods they were to eat and the portion sizes correlated to the weight in grams. After the first month, participants were able to continue to diet by personally managing their food choices, while adhering to the gram allowance and writing in their food diary.

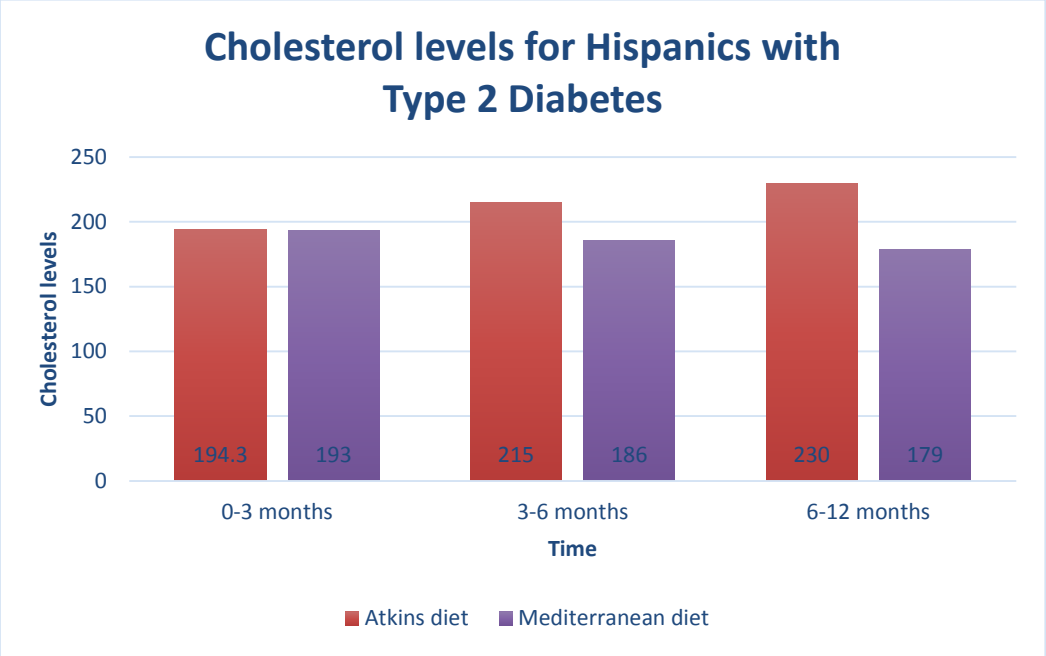
At the three-month mark, each participant was interviewed by a health professional such as a nurse, to measure their progress and give feedback on ways to improve or continue their food management. The physician would then check their A1C levels and BMI, and explain to them whether or not they were making progress. Once the 6th and 12th-month marks approached, another individual interview was held to track the participants' progress. This time the diaries were read and kept in the individual's record. Once the 12-month period came to an end, participants received a personal interview once again, but this time it consisted of precise measurements of weight, A1C levels, BMI, cholesterol, and LDL levels. The interviews were all held at the Clinic Research Center. The results for this study are indicated in the following section.

Results

The graphs below show a numerical image of the results for this study. Comparisons between each diet group are shown, along with the results of the average correspondent BMI levels and A1C (glucose) levels.







The participants had similar results in glycemic levels, blood pressure, weight, and lipids at the beginning of the study. During the first three months, the Atkin's diet (low carbs), lost an average of 1.4 kg/month, and in the months 3-12, lost an average of 1.7 kg/month. In contrast, the Mediterranean diet (low-fat) had a more significant rate of 2.4 kg/month and became stable during months 3-12 with an average weight gain of 0.4 kg/month. At one year, there was 4% weight decrease in both groups during the early phase and stagnant percentages of 5% during the late period. There was a significant difference in the rate of change in A1C levels between both dietary groups. On average, low-carb participants had a decrease in A1C levels of 0.15 per month during the early phase (0-3 months) and a more rapid decline with A1C levels in 0.20 during the late period (6-12 months). Low-fat participants had a decrease of 0.17 in A1C percentage during the early phase, and a 0.25 decrease during the later phase. Insulin dosage remained the same and was not altered during the study. Over the 6-month time, there were significant changes in total cholesterol, LDL, and triglyceride levels. The Mediterranean diet (low-fat) group had a drastic rate of 7 mg decrease in cholesterol levels per month. Unlike the Mediterranean diet group, the Atkin's diet (low-carb) group had a significant increase in the rate of cholesterol levels, with 5.7 mg per month. During the months 6-12, cholesterol levels continued to increase for the low carb group while it decreased for the low-fat group. The BMI for both diet groups reduced at a rate of 0.2 kg per month, with the low-carb group exceeding the rate of 0.4 kg per month during the late phase.

Conclusions

Our results indicate that after one year, diabetic patients adhering to the Mediterranean diet had a slightly more significant weight loss. The food options in this menu are low fat, plant-based, limited red meat and dairy products, and an abundance of vegetables and fruits. This low-fat and relatively healthy diet contributes to the more significant weight loss in participants of this group in comparison to the low-carb diet group. The low-carb group consumed an Atkin’s based diet, which included all types of meat, fish, fats, and oils, and dairy products. This menu was more versatile than the Mediterranean diet because it had a wider variety of food options, leading to a slower and less significant weight loss for the participants in the group. Although insulin intake was not altered for the participants, the results showed a substantial A1C level decrease and maintenance throughout the year for both low-carb and low-fat diets. Glucose management is crucial, especially for diabetic patients. Although the results demonstrated different level increases, either diet is recommended to improve or maintain healthy glucose levels in the body. The cholesterol levels for the participants who followed the low-carb diet had a slight increase in LDL and triglyceride levels. This is likely due to the consumption of meat, unlike the low-fat diet, which limited the intake of meat. The body mass index

(BMI) decreased due to the reduction in sugar consumption, which promotes fat loss. In the end, the results showed improvement that the participants would benefit from for a lifetime. This study can also impact the community and bring more awareness to making healthy lifestyle choices for the benefit of their health, both for people with and without diabetes.

A few of the limitations of this study were specific requirements, such as only measuring a particular group of Hispanics and diabetics, with a specific level of glucose, cholesterol, and BMI. In future research, more studies can be made where more variables are measured to take a closer look at how patients with diabetes can take better control and care of their disease and body in general. These results would complement the results already found in our study by providing more critical information that is of great help to the participants benefitting from the study. This study did not measure culture influence, but it is due to the massive Hispanic culture influence that healthy eating habits seem almost unachievable for people. Hispanic cultures consume diet foods that are incredibly high in saturated fats, carbohydrates, and sugar. This has a negative impact on individuals of all ages, but especially those with diabetes. It also increases the likelihood of them developing a disease such as diabetes, and other metabolic disorders.

Unfortunately, one lives in a society where cheap and fast food is better than healthy choices at a regular price. Super-sized meals at a low cost have become widely accepted in American society, making it difficult for individuals, especially low-income families, to make healthy choices. One way that a difference can be made is by changing the way minds think when it comes to food, by getting informed and educated on what is right or wrong for one's health. Health education groups or classes can make education accessible for every person, free of cost. The educational portion of the study helped the participants learn how to measure and monitor their blood sugar levels and also taught them about healthy food choices based on either diet assigned to them. Putting the specific diets aside, the menu for each group contained a variety of healthy food options that in return give them a scope of what to eat and not eat. Even after the study, they can put their education to practice in their day to day lives, and help others learn to do the same. By doing this, we positively influence the community and help them become more aware of how to take care of themselves and eat correctly.

According to the National Sustainable Agricultural Coalition, the government has attempted to help by passing the Agricultural Act, otherwise known as the Farm Bill. The Farm Bill has governed over the production and distribution of food since 1933, when it was passed by Congress as the Agricultural Adjustment Act, and has been modified up until the most recent Farm Bill of 2014 ("National Sustainable Agricultural coalition", 2002). The purpose of this act was to help low-income families afford groceries at a more convenient and accessible price. However, this has led to individuals investing in inexpensive but also unhealthy foods that have an enormous negative impact, putting diseases like diabetes on the rise (Institute for Agriculture and Trade Policy, 2012). The United States meat industry has also made it difficult for individuals to have genuinely organic meats provided for them at grocery stores. Over 80% of the meat packing industry is administered by four main conglomerates (Schwennnesen, n.d.). The percentage of "food-dollar" has dropped over 25% since 1970 and over 40% of family cattle operations no longer exist since 1980 (Schwennesen, n.d.). Money and power are both related to this issue because the government, essentially the power-house behind the bills passed and laws made, will not pay attention to the negative health impact on individuals as long as spending is less for them. The government does not want to spend any more than they have to on agriculture and still manage to over-produce food for the country. What goes into the food and how it is produced is no longer a concern for them because they are keeping their money in their pockets. One proposal that can be implemented to change this is the removing of subsidies from unhealthy foods and subsidizing fruits and vegetables instead (Fields, S., 2004). This would help people make healthier dietary choices and help reduce metabolic diseases, and even reduce the health care costs of diet-related illnesses. Subsidizing healthier foods would also make it more accessible and affordable for low-income families, who may desire to make healthy life choices but income gets in the way of achieving that possibility. Some countries have exclusively let go of government "assistance" and have had promising results with no subsidies in agriculture. An example of this success was made in New Zealand in 1984. Such improvements may seem unachievable after increasing economic and agricultural advances, but New Zealand has proved otherwise (Schennensen, n.d.). In 1984, New Zealand ended subsidies, resulting in positive results and more people involved in the business

(Schennensen, n.d.). Since then, New Zealand has had roughly the same number of employed individuals in agriculture as it did 30 years ago, and about the same number of people living in rural areas. The New Zealand farmers "are significantly better off today than in the hay-day of government assistance" (Schennensen, n.d., p. 11). By implementing subsidies on healthy foods, or simply eliminating them, the American society can slowly change from unhealthy ways to new and improved ways of caring for personal health and raising health-oriented families.

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