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Exploring the Effects of Different Types of Diets on Preventing and Managing Diabetes Mellitus Type 2

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**Exploring the Effects of Different Types of Diets on
Preventing and Managing Diabetes Mellitus Type 2**

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NURS 4500: Nursing Research and Senior Thesis

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Abstract

Diabetes is a major health problem that is becoming an epidemic in major countries of the world. Diabetes can affect people of all ages and of all races. However, there is a higher risk of developing diabetes for certain groups of people. As of today, there is still no cure for diabetes. The treatment plan for patients diagnosed with diabetes is to control the level of blood glucose through different interventions. The progression of diabetes is influenced by food behaviors, and diet control is an important aspect of management of this disease. There are different types of diet recommended that will not affect blood glucose levels. However, these types of diets do not coincide with many people's culture and dietary habits. This paper consists of six studies that explore the effect of different types of diet on maintaining or preventing DM2. Studies are divided into two categories: weight loss targeted diet and disease specific to ethnic groups. Studies from both categories show positive effects on the glycemic index of individuals with Diabetes Mellitus Type 2. The studies in this literature highlight the effects of diets that are fiber-rich diets rich in fiber, but carbohydrate rich diets, on which some cultures rely, are not included. Further research is needed. A research proposal is described at the end of this paper.

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Introduction

Diabetes Mellitus is a chronic condition that occurs when the pancreas does not produce enough insulin or does not use the insulin effectively. Insulin controls the body's glucose level.. There are two types of Diabetes Mellitus, Type 1 and Type 2. Diabetes Mellitus Type 1 is characterized by the body's inability to produce insulin while Diabetes Mellitus Type 2 (DM2) is characterized by the body's inability to properly use insulin (American Diabetes Organization, 2022). According to the World Health Organization (2022), "more than 95% of people with diabetes have type 2 diabetes" around the world (Section 3). With diabetes, insulin cannot properly regulate the glucose levels in the body which leads to having raised blood sugar which is called hyperglycemia. Over time, uncontrolled blood diabetes will lead to serious damages to different body systems. This is why early detection is important to reduce the risk of further diseases through different interventions that will help maintain a normal blood glucose level.

As of today, there is still no cure for diabetes. The treatment plan for patients diagnosed with diabetes is to control the level of blood glucose through different interventions. Through various glucose testing, interventions can be used for patients with borderline levels for blood glucose to prevent developing into diabetes. Physical activities and diet are two of the most important parts that health care providers emphasize for patients. Diabetic education and the patient's engagement are crucial parts of the treatment as there might be some lifestyle changes that will occur.

Problem Statement

As of today, almost 37.3 million people of all ages or 11.3% of the United States (U.S) population has diabetes and about 96 million adults aged 18 years or older had pre-diabetes (Centers for Disease Control, 2022), illustrated that blood sugar control in the U.S. is a massive

problem. Managing and preventing Diabetes Mellitus Type 2 (DM2) heavily relies on the food intake of the person. There are different food habits that are practiced in different cultures that affect the glycemic level of the person differently. Often, people argue that diabetic food regimens take away aspects of their culture and tradition which leads to poor management of their disease. Exploring different types of diets in connection with the effects on blood glucose levels will allow more understanding on how people at risk for diabetes can control their diet while incorporating healthy food habits.

Research Question

The research question for this study is: What are the effects of different types of diets on preventing and managing Diabetes Mellitus Type 2?

Relevance

Among the people with DM2 in the United States “14.5% are adults of American Indians/Alaskan Natives, 12.1% are non-Hispanic black, 11.8 % Hispanic and 9.5% are Asian American” (American Diabetes Organization, 2022). Diabetes management and treatment heavily rely on the patient’s willingness to participate with lifestyle changes that will occur. Diet is one of the most important factors in maintaining low blood glucose levels. However, the teachings that are given to most of the patients do not involve the culture and food traditions that they follow. This paper will explore the effect of diet on maintaining or preventing DM2.

Literature Review

Introduction

The literature review of this paper is made of original research articles retrieved from Dominican Library Databases such as CINAHL and PubMed. A number of search terms are used to find articles that are related to the topic including: Diabetes Mellitus Type 2; glucose control;

weight-loss diet; Mediterranean Diet; Asian Diet; culture; and food and diabetes. Using these keywords, the search revealed primary and secondary studies. Only primary research sources were used for this review. To ensure that each primary article was related to the topic and relevant, titles and abstracts were screened. Six research articles are used to represent the effect of different types of diets on preventing and managing Diabetes Mellitus Type 2. (See Appendix A: Literature Review Table for summary of the articles)

Studies for this literature review are divided into two categories. The first category will focus on the weight-loss targeted diet. Reduction of weight is one of the main goals that are given to people who are at risk for DM2 or are newly diagnosed with the disease. The articles examine how significant weight loss contributes to lowering glucose index. The second category will focus on the specific ethnic groups. The articles in this category will explore how modification of specific diets in accordance with DM2 affects the glycemic index of individuals. Diet is a major part of maintaining low levels of glucose index and decreasing the risk of diabetic complications, which is why it is crucial to explore not only the recommended diet but also how specific ethnic diets affect the glucose levels of the body.

Category I: Weight-Loss Targeted Diets

There are three studies in this first category. These studies focus on the diet that targets weight loss. These are the types of diets that are usually recommended to people who are at risk for DM2 or are newly diagnosed. These studies are generalized on diets that focus on the nutritional intake of an individual and the effects on their glycemic index.

The study by Bernard et al. (2009) aims to compare the effects of low-fat vegan diet and conventional diabetes diet recommendations on glycemia, weight, and plasma lipids. This study is a randomized, controlled clinical trial. There are 99 participants from the Washington, DC area

included in the study randomly assigned into the two groups of the study: vegan-diet (n=49) and conventional diet (n=50). The participants in each group were given instructions on the specific diet they will have to follow as well as an hour meeting with a registered dietitian to establish a diet plan. The intervention group is asked to avoid specific food categories but portion sizes, energy intake and carbohydrates intake are all unrestricted (Bernard et al. 2009). Conventional diets were individualized based on the participants body weight, plasma lipid concentrations and were all prescribed energy deficits of 500-1000 kcal (Bernard et al. 2009). To ensure adherence to specific diets, the participants received multiple calls from dietitians asking for 24-hour dietary recall from multiple times across the study.

To gather data, laboratory measurements were taken after a 12-hour fast to collect values for the HbA1c, plasma glucose, and plasma lipids at six different times across the timeframe of the study. The researchers found that by the end of the study, 71 % of the participants in the vegan-diet group and 58% of the conventional group had changed their diabetic medications, as prescribed by physicians per the study protocol or without authorization by the researchers (Bernard et al. 2009). A major finding from the study includes a “weight loss of 6.8 kg in the vegan group and 4.9 kg in the conventional group” which is significant because weight reduction has some effects on glucose levels (Bernard et al. 2009, pg. 90). As for the glycemic control, researchers found that participants that are not taking medication have seen a HbA1c change of -0.34 and -0.14 for the vegan group and conventional group, respectively (Bernard et al. 2009). Another analysis for HbA1c is conducted to reflect the changes for participants taking medication and found that there is a -0.40 and 0.01 change in the HbA1c of vegan and conventional diet, respectively (Bernard et al. 2009). The researchers in this study discuss that there is a major change in the energy intake and that low-fat diets are more effective in reducing

HbA1c by a slightly significant amount than diet based on guidelines given by the American Diabetes Association. This study's strengths are that it is longer than other studies with this topic and that there are constant follow ups with the adherence to diet. Additionally, data is gathered multiple times across several weeks of the study to have a large comparable data. One limitation of this study is that it does not explicitly say how the medication of the patients have changed which can be crucial to knowing if it was increased or decreased in dose.

The second study by Steven et al. (2016) tests the potential of durability of the very-low calorie diet (VLCD) on normalizing glucose control for people with DM2. This prospective, longitudinal single-center study consisted of 30 individuals with DM2 who are between 25 to 80 years old. The study is made up of three phases: an 8-week VLCD adherence, then a two-week period to return to iso caloric intake on normal food, and a 6-month long individualized weight maintenance program (Steven et al. 2016). The VLCD diet consists of a liquid diet formula with an additional 240 grams of non-starchy vegetables and consumes at least 2 liters of calorie-free beverage every day (Steven et al. 2016). For the 2-week return, diet is returned from liquid diet to shakes until gradually transitioning to full meals. Lastly, for the 6-month period of weight maintenance, the goal of this phase is "to prevent weight regain by individualized weight trajectory" (Steven et al. 2016, pg. 809).

For this study, participants were asked to fast overnight in order to gain samples from them from specific veins the antecubital vein for infusion and contralateral wrist vein for arterialized blood sampling to determine hepatic glucose production (Steven et al. 2016). This lasted for 150 minutes to calculate the hepatic glucose production and fasting insulin levels. The study resulted with a weight loss from " 98.0 ± 2.6 kg at baseline to 83.8 ± 2.6 kg during the VLCD" which resulted in 40% of the participants achieving the goal of 7.0 mmol/L of fasting

glucose level (Steven et al. 2016, pg. 810). The study has shown that 40% of the participants return to their nondiabetic blood glucose levels which was characterized by “improvement in acute insulin secretion” (Steven et al. 2016, pg 813). The study explains how VLCD has benefits in reducing glucose levels as well as the pathological effects this diet has on the body. Some strengths of this study include having a clear basis on what a responder is and a nonresponder, a consistent follow-up and checking up on the participants, and a plan to maintain the diet and adhere to the study. Some limitations include a small sample size and a short duration of the study. The short period of testing the diet might be beneficial for the trial since it is a big change on the diet, but it does not explain how this will affect people who choose to do this diet for a longer period of time.

The final study in this category by Saslow et al. (2017) aims to determine whether a very-low carbohydrate ketogenic diet or the diet program based on the American Diabetes Association improve glycemic control among overweight individuals with DM2. This parallel-group, balanced randomization trial consists of 25 participants that are randomly placed in two groups: the intervention group and control group. The control group will follow the “Create Your Plate” diet provided by the American Diabetes Association to follow a low-fat diet while the intervention group were given the instructions to reduce carbohydrate intake to 20-50 grams per day (Saslow et al. 2017). Both groups will receive emails with lessons containing videos, printouts, and flyers to help adhere to their diet. This study will run for 32 weeks.

For this study, all participants were asked to come in to get measurements at the beginning for baseline measurements, and at week 16 and 32. There are quantitative and qualitative aspects of the study where researchers gather data to assess HbA1c levels, cholesterol, triglycerides and body weights in addition to psychological, physical and dietary

self-reports. The study showed a significant reduction in HbA1c for the intervention group where they saw a -0.9% reduction at 16 weeks and -0.8% at 32 weeks (Saslow et al. 2017). In addition, at both 16- and 32-week checks of participants' weight, the researchers reported, there is “at least a 5% loss of body weight compared to participants in the control group” (Saslow et al. 2017). For the other measurements taken, the researchers did not see any significant difference on any diabetes-related stress or any reported depressive symptoms. By the end of the study, the researchers saw a decrease in medications for participants in both groups (Saslow et al. 2017). Some limitations of this study is that the sample is relatively small and the length of the study is short.

Summary of Category I

The three studies highlight different weight-loss diets and the metabolic effects on participants with DM2. All three studies compared their study to the conventional diet that the American Diabetic Association recommends for lowering glucose index. The results of the studies shows how weight loss can affect the change in the HbA1c. The main limitation for all three studies is that the sample sizes are relatively small. A larger sample size is needed to understand the durability of the diets in a larger and more diverse population.

Category II: Diets Specific to Ethnic Groups

There are three articles in this second category. These studies examined ethnic specific diets from different regions. Many people diagnosed with DM2 have trouble adhering to the recommended diet as it takes away some of the aspects of the culture in their diet. These studies will explore how diets affect the glycemic index. In addition, the study in the following article allows education of the diets for the participants to be culturally modified to fit the diabetic diets.

This study by Dhilon et al. (2016) aims to fill the gap by studying the association of legumes with fasting glucose levels, insulin resistance and diabetes risks. This quantitative study consists of 6,367 participants between the ages of 15 and 76 years old who live in Lucknow, Nagpur, Hyderabad and Bangalore India. To gather information participants were asked to report their intake of 184 items on questionnaire for a one-year period (Dhilon et al. 2016). Legumes are an essential part of the Indian diet and are included in preparations of the items on questionnaires which is why researchers added the weight in grams to get data. The researchers also gathered information on the physical activities of people living in those areas such as physical activities, jobs, and socioeconomic status that would affect their consumption. When evaluating the four sites, the researchers found that there are no association between legume consumption and fasting glucose on all four sites (Dhilon et al. 2016). However, they also found that there is an inverse association between legume intake and the intake of carbohydrates, proteins, fat, and sugar which affects the glucose levels more (Dhilon et al. 2016). Researchers of this study conclude that diets high in legumes are beneficial for lowering blood glucose level (Dhilon et al. 2016). This study is the first large scale study to evaluate legume consumption on a specific group of people. A limitation of this study is that there are no explicit results on the glucose levels or anthropomorphic measurements taken.

The study done by Piombo et al. (2020) aims to test whether a culturally tailored intervention, based on a customized diet and transcultural mediator's support can improve diabetic immigrant's food habits. This pre-post quali-quantitative study includes 55 patients who are between the ages of 20-79 and are Bangladeshi or North African diabetic immigrant patients at the National Institute for Health Migration and Poverty in Italy. The study do not have a good distribution between sex having 49 males and 6 females. For this study, participants were given a

questionnaire to act as a baseline about their food habit in regards to their socio-economic habits. There are five culturally tailored dietary profiles that are developed by the nutritionists with each one following the international diabetes guidelines (Piombo et al. 2020). Participants receive counseling about their diet and customized diets are made with the dieticians.

To study the results, the participants were asked for a follow up at the 3 month mark and 6 month mark. The researchers decided that only differences between the pre- and post-interventions with $p < 0.05$ will be considered statistically significant (Piombo et al. 2020). After the 6 months, patients' food habits improve, having a p score of 0.04 for cereals, meals ($p = 0.02$) and potatoes ($p = 0.03$) (Piombo et al. 2020). The study also assessed patients' feedbacks on the diet having "93% reporting a positive life change after the nutrition recommendation" (Piombo et al. 2020). Some of the main comments from the patients were "better understand what my illness consists of," "to better understand the dietary indicators or how to take medicine," and "I didn't feel alone" (Piombo et al. 2020, pg.7). The intervention that this study applies shows a positive change on patients when culture is included with the plan of care. Their diet is slightly modified without sacrificing their cultural diets. One limitation of this study is the lack of sex balance, having many more male than female participants means that the findings might apply to males only, limiting the generalizability of the results. Additionally, there was a small sample size and a short duration of the study.

The last study for this category is a study by Vitale et al. (2018) that evaluates the Mediterranean diet and the individual components with cardiovascular risk factors profile, plasma glucose, and BMI for patients with DM2. The cross-sectional study consists of 2568 participants with DM2 who are between the ages of 50 and 75 years and are recruited from 57 different centers throughout Italy. The researchers measured anthropomorphic dimensions, blood

samples and assessed their eating habits using the European Prospective Investigation into Cancer and Nutrition (Epic) questionnaire of 248 items on 188 different foods (Vitale et al. 2018). Adherence to the diet was rated using the relative Mediterranean diet (rMed) score of 0 to 18, the higher score is characterized by “lower energy content, lower intake of proteins, and lower glycemic index” (Vitale et al. 2018). The results showed that there is a significantly lower HbA1c levels of people scoring a lower rMed having 7.69% HbA1c and 7.63% for people who score higher rMED which as a p score of 0.038 which shows significant change statistically (Vitale et al. 2018). This study’s large sample size of 2568 participants allows the researchers to have more confidence in their findings. The data that was collected highlights some of the real-life practices of the participants. However, some limitations of the study include being collection of data being prone to recall bias and that there is no statement about participants having been on medications.

Summary of Category II

The studies in category two discuss the inclusion of specific cultural aspects of the in an individual’s diet and the effect on development or control of DM2. Assessments for the studies are done through questionnaires that are filled with specific food groups or choices from their culture.

Summary of Literature Review

Overall, the studies from both categories show different types of diets and their effect on the glucose index of an individual with DM2. For category one, a strength that the studies have is that they compare the specific diet they are studying to the conventional diet that the American Diabetes Association. The comparison shows the positive difference the specific diet could have. However, the studies are limited due to the short-term and time frame and cross-sectional design

(none were longitudinal), as well as a small sample size. For the studies in category two, studies are very specific to cultural groups and consider specific parts of their culture and diet in the study. These studies show that culture does not have to be sacrificed in order to prevent any complications from DM2. However, there are gaps in literature with specific ethnic groups that are at higher risk for DM2. The studies in this literature review demonstrates the positive effects of diets that are fiber-rich in reducing DM2 risks for certain ethnic groups. However, carbohydrate rich diets, upon which some cultures rely, are not included. Clearly, further research is needed.

Research Proposal

Introduction

With more than 400 million people living with diabetes and 1.5 million people dying directly from diabetes every year, diabetes is now one of the fastest growing non-communicable diseases in the world (World Health Organization, 2022). Diabetes affects almost all ranges of ages in people and race. There is a high risk for developing this disease with many ethnic groups such as Asian, Pacific Islanders, African Americans, and Latin Americans. Filipino Americans are at a high risk for DM2 despite having a low body mass index. According to a study done by Raquino et al (2018), there is a prevalence of overweight and obesity from first generation to third generation Filipino American. This prevalence explains the higher risk of Filipinos and Filipino Immigrants living in the United States compared to Filipinos living in the Philippines. From the literature review, there is a lack of data for culturally integrated intervention specifically on management of diabetes in Filipino Americans.

Research Question

How does culturally integrated diet education affect the glucose levels for Filipinos with DM2?

Theoretical Framework

Pender's Health Promotion Model will be the main theory used for this study. This model defines health as a positive dynamic state rather than simply an absence of disease and is directed at increasing the well-being of the individual (Petirin, 2020). This model focuses on the individual characteristics and experiences, behavior specific cognitions and behavioral outcomes that are unique and can be modified for every individual. The model integrates biological, psychological and socio-cultural factors that can be predicted and are shaped by the nature of the individual behavior (Petirin, 2020). For this model, interpersonal influences such as behaviors, beliefs, attitude are also included.

This model relates to the proposed research study because of the specific focus on participant's behavior and the effect on their glycemic level. Behavior of people in relation to their disease and intervention can affect how much the progression of the disease will become. Focusing on the diet, the study will incorporate the culture and participant's behaviors for the management of their disease. The proposed research will incorporate this model to highlight the importance of having a culturally tailored intervention for individuals and their well-being. This study will also take into consideration the different aspects of the participant's activities prior to the study.

Primary Research Aim

To determine the effectiveness of culturally tailored intervention for maintaining normal glucose levels for Filipino American with DM2.

Ethical Considerations

This study will be reviewed by the Dominican University Institutional Review Board (IRB). Approval from the IRB will be obtained before the start of data collection. Also, there will need to be consent and approval from local hospitals in which recruitment flyers will be posted. In addition, this study will need to be reviewed by the ethics committee and possibly the IRB of the endocrinology clinics which will be asked to help with the study by referring patients who are eligible. Informed consent will be needed from potential candidates prior to joining the study. Potential participants will have the study explained to them in detail and will be informed that they are allowed to withdraw from the study at any time without any negative consequences to provision of their healthcare.

Research Methods

Study Population

The study's participants will include 100 male and female Filipino Americans between the ages 25 to 70 years old, living in Northern California. In addition, the criteria for inclusion in the study will be patients who are diagnosed with Type 2 Diabetes for at least 6 months or who are diagnosed with prediabetes. For recruitment, it will be best to get the participants from direct referral from providers which means that researchers will need to talk to many endocrinology clinics to have information for volunteers. In addition, there will be flyers posted on Kaiser Hospitals in Northern California as well as some social media platforms that will direct potential participants to a link with a recruitment form to fill out. The recruitment forms that the possible participants will fill out includes questions such as their age, how long they have been diagnosed with DM2, any other diagnosis they have other than DM2. In addition to these questions, those who are interested in participating will also answer a question asking if they are Filipino

Immigrants or first or second-generation Filipino Americans. After selecting the eligible participants for the study, the researchers will give the participants consent forms and they will be given information about the study, what they will be doing, how long the study is going to take and some other information that will be important for them to know such as being able to get out of the study anytime they want.

Study Design and Methodology

This study will be a mixed study which includes both qualitative and quantitative research. The study will take place over a span of one year. In the beginning of the study, the participants will answer a questionnaire that asks certain questions about themselves. The questionnaire will include questions such as rating their levels of physical activity from 1-10 and the types of activity they do, rating their food habits and how well they follow the recommended diet for diabetes control, alcohol, and tobacco intake if there is any, and they will also list a 24-hour diet recall. In addition to the questionnaires, the researchers will also be getting anthropomorphic measurements such as their height and weight and they will get a fasting blood glucose level. All of these measurements will serve as the baseline for the study.

For the study, the group will be getting an education on the diet that is suitable for diabetes. Then, they will each meet with a dietician, one that is equipped with knowledge on the Filipino diet and will make a 2-week meal plan for them. In addition, they will be getting pamphlets that would have alternatives or portion sizes to incorporate a certain Filipino dish into their diet. At the end of the survey, the participants will be asked to answer questions such as “describe your stress level,” “how do you feel about this meal plan” and other open-ended questions.

The participants will need to follow this meal plan strictly for the first two weeks, and the remaining weeks and months, they will have to be able to create their own meal plan that works for them. Apart from that, the participants will be receiving some telehealth calls from nurses or researchers to ask about their diets and well-being. They will also be informed that they can reach out to the researchers for any questions.

The participants will meet with researchers on the 3-month mark, 6-month and after one year. With the follow-up, the participants will answer the same questionnaires given during the first day, get height and weight measurements, fasting blood glucose levels, a 24-hour diet recall and their answers to the open-ended question, which now will include describing stress levels on creating a meal plan.

Study Analysis

The data that will be gathered from the surveys will be analyzed quantitatively. Demographic and anthropometric measurement data will be assessed using descriptive statistics, such as percentages, mean, median, and mode. Blood sugar level and answers from the surveys, regarding diet compliance and exercise will be compared using statistical computer software (such as SPSS). A p-value of less than 0.05 will be regarded as statistically significant. All the findings from the analysis will then be compared to the follow-up data to see if there are any changes, positive or negative with the results.

The qualitative answers collected from the open-ended questions will be analyzed by the researchers. The answers will be read and discussed by the research team, and similar words and phrases will be grouped together in categories. From the categories, the researchers will explore the themes that emerge.

Conclusion

Diabetes is becoming a major public health concern with the rapid increase of numbers with people being diagnosed with it. Diabetes can be caused by many factors; however, a person's lifestyle can greatly affect the progression of the disease. Diet is one of the most important factors that can greatly affect the progression of diabetes and is one of the first interventions in prevention and management of the disease. From the literature review, the studies conducted about weight-loss diets show the positive difference that this form of diet can have with the glucose levels of many people. Although the studies have been short-term, they still show that weight loss and adherence to the recommended diet can affect the progression of the disease. Also, the literature review also includes studies that are specific to different ethnic groups and their diet. The studies demonstrate how one's culture does not have to be sacrificed to reduce the risk of the disease from progressing; but, minor changes in the meal planning can include the recommended diet while incorporating one's culture.

Health care providers provide holistic care for their patients. Apart from knowing the disease, they should also include the social life and culture of the patients into their plan of care. Patient education is an important part of a nurse's role. Educating a patient helps improve their health status and empowering them by providing them resources and helping them engage with the interventions. Being able to help patients incorporate their culture and food habits into the diet can help increase adherence to diet and improve their health and reduce any complications with any progression of DM2.

There are millions of Filipinos and Filipino Americans living in the United States. Filipinos are at risk for developing diabetes. On top of that, there is a limited amount of study done on how the Filipino Diet affects glucose levels. This research proposal can help understand

how the Filipino Diet affects the glucose levels of patients. In addition, it can also open more studies on how much more can be changed to improve the recommended diet for people with Diabetes by incorporating their culture in the meal plan.

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Appendix A: Literature Review Table

Authors/Citation	Purpose/Objective of Study	Sample - Population of interest, sample size	Study Design and Methods	Major Finding(s)	Strength/ Limitations
Barnard, N. D., Cohen, J., Jenkins, D. J., Turner-McGrievy, G., Gloede, L., Green, A., & Ferdowsian, H. (2009). A low-fat vegan diet and a conventional diabetes diet in the treatment of type 2 diabetes: a randomized, controlled, 74-wk clinical trial. The American journal of clinical nutrition, 89(5), 1588S–1596S. https://doi.org/10.3945/ajcn.2009.26736H	To compare the effects of low-fat vegan diets and “conventional diabetes diet recommendations” on glycemia, weight and plasma lipid	sample size: 99 participants (39 males, 60 females) population of interest: <ul style="list-style-type: none"> ● people with DM2 ● fasting glucose of >125 mg/dL or prior diagnosis of DM2 with medications of about 6 months. ● no history of smoking, drug abuse, or not using low-fat vegetarian diet 	Design: randomized, controlled clinical trial Method: <ul style="list-style-type: none"> ● 74 weeks long trial ● Participants were ranked based on HbA1c levels and randomly placed in a group ● Controlled group: conventional diet (n=50) ● Intervention group: prescribed vegan diet (n=49) ● Both met with a registered dietician in the beginning of the trial with 7 different follow ups. ● laboratory measures at 0, 11, 22, 35, 48, 61, and 74 weeks to measure plasma, glucose, cholesterol, triglyceride, and urinary albumin 	<ul style="list-style-type: none"> ● significant weight loss on both groups and related to significant Hb A1c changes. ● By the end of the 74 weeks, 71% of the participants in the vegan-diet group altered their diabetes medication whereas 58% of participants in the conventional diet changed their medication. ● There is no significant difference between the two groups in terms of body weight changes ● As for glycemic control, participants without medications' HbA1c changes from baseline were -0.34 for the vegan group and 0.01 for the conventional group. <ul style="list-style-type: none"> ○ mean change is slightly but not significantly greater in vegan-diet 	Strengths: <ul style="list-style-type: none"> ● Good amount of participants with long-standing diabetes ● This study is one year longer than the other studies ● there is consistency with the adherence to the participant’s diet Limitations: <ul style="list-style-type: none"> ● The doses of medication and the changes are not explicitly stated ● The study is not long enough to see any long-term effects for the diets
Sarah Steven, Kieren G. Hollingsworth, Ahmad Al-Mrabeh, Leah Avery, Benjamin Aribisala, Muriel	To test the potential durability of the normalization of a low caloric diet for people with DM2	Sample Size: 30 individuals with DM2 Population of interest	Design: prospective, longitudinal single-center study Method:	<ul style="list-style-type: none"> ● immediately after the 8-week VLCD about 87% of short and 50% on long-duration diabetes have achieved the fasting glucose levels 	Strengths: <ul style="list-style-type: none"> ● there is a clear basis on what they want as a responder for the study and nonresponder

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Caslake, Roy Taylor (2016) . Very Low-Calorie Diet and 6 Months of Weight Stability in Type 2 Diabetes: Pathophysiological Changes in Responders and Nonresponders. Diabetes Care. 39 (5): 808–815. https://doi.org/10.2337/dc15-1942		<ul style="list-style-type: none"> Study consisted of people ages 25-80, BMI 27-45 kg/m2. Some exclusions would be recent weight loss of more 	The study is compromised three phases: <ul style="list-style-type: none"> First very low calorie diet (VLCD) for 8 weeks, assessments were taken to get baseline a stepped return to isocaloric intake of normal food over 3 week a structured, individualized weight maintenance program over 6 months as a basis, a fasting glucose of <7 mmol/L after the return to isocaloric will be defined as responder 	<ul style="list-style-type: none"> weight fell (98.0 to 83.8 +/- 2.4kg) and remained stable over 6 months. 12 out of the 30 participants reached fasting blood glucose of <7 mmol/L after return to isocaloric diet HBa1c fell from 7.1 ±0.3 to 5.8 ±2 in responders and from 8.4 ±0.3 to 8.0±0.5 % in non responders 40% of the participants who responded to VLCD, remission of DM2 lasts for at least 6 months. 	<ul style="list-style-type: none"> there is consistent follow-up on participants to check adherence to the diet Limitations: <ul style="list-style-type: none"> Small sample size Short duration of study
Saslow, L. R., Mason, A. E., Kim, S., Goldman, V., Ploutz-Snyder, R., Bayandorian, H., Daubenmier, J., Hecht, F. M., & Moskowitz, J. T. (2017). An Online Intervention Comparing a Very Low-Carbohydrate Ketogenic Diet and Lifestyle Recommendations	To determine whether an online intervention based on very-low carbohydrate ketogenic diet or conventional low-fat diet would improve glycemic control among overweight individuals with DM2.	sample size: 25 participants (10 males and 15 females) population of interest: <ul style="list-style-type: none"> ages 18 and older BMI of 25 or more overweight adults with DM2 	Design: parallel-group, balanced randomization trial Method: <ul style="list-style-type: none"> 32 week-online intervention the intervention group were given instructions to reduce carbohydrate intake to 20-50 grams participants were mailed urinary acetoacetate to test their ketones in their urines emailing participants new lessons 	<ul style="list-style-type: none"> significant reduction in HbA1c for intervention group at 16 weeks (P=0.01) and 32 weeks (P=0.002) marginal mean of -0.9% at 16 weeks and -0.8% at 32 weeks for reduction of HbA1c significantly greater weight reductions for participants in the intervention groups. there are no significant differences on any diabetes-related distress or any 	Strengths: <ul style="list-style-type: none"> all interventions made are in person there is quantitative data gathered as well as qualitative data on how the participants are feeling Limitations: <ul style="list-style-type: none"> Small sample size length of follow up is short

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Versus a Plate Method Diet in Overweight Individuals With Type 2 Diabetes: A Randomized Controlled Trial. Journal of medical Internet research, 19(2), e36. https://doi.org/10.2196/jmir.5806			<ul style="list-style-type: none"> the control group using “Create Your Plate” diet measurement at baseline and week 16 and 32 using blood test, body weight, psychological, dietary and physical self-reports 	<p>depressive symptoms, affect and vitality that might arise</p> <ul style="list-style-type: none"> There is a decrease in medications (Meetformin) for participants in both groups 	
Dhillon, P. K., Bowen, L., Kinra, S., Bharathi, A. V., Agrawal, S., Prabhakaran, D., Reddy, K. S., Ebrahim, S., & Indian Migration Study Group (2016). Legume consumption and its association with fasting glucose, insulin resistance and type 2 diabetes in the Indian Migration Study. Public health nutrition, 19(16), 3017–3026. https://doi.org/10.1017/S1368980016001233	to evaluate the association of legumes with FG levels, insulin resistance and diabetes risk	<p>sample size: 6367 participants</p> <p>population of interest</p> <ul style="list-style-type: none"> men and women aged 15-76 who lives in Lucknow, Nagpur, Hyderabad, and Bangalore, India 	<p>Design: Quantitative</p> <p>Method:</p> <ul style="list-style-type: none"> diet was assessed using a semi-quantitative FFQ that captured common dietary patterns across all four sites anthropometric measurements have been described in details and were compared after a few months 	<ul style="list-style-type: none"> Median consumption of legumes was 52.1 g, with 24% higher consumption in men than women. study found no association between quartiles of legume consumption and fasting glucose no association between legume consumption and insulin resistance inverse association emerged between legume intake and fasting glucose for those with highest daily intakes of carbohydrate, protein, fat, and sugar 	<p>Strengths:</p> <ul style="list-style-type: none"> very specific population study and large number of study participants first large-scale epidemiological study to evaluate legume consumption <p>Limitations:</p> <ul style="list-style-type: none"> FFQ may overestimate intakes of certain nutrients limited power to detect an association with diabetes This may be a potential source of bias as evidenced from a sub-analysis excluding persons with diabetes, where we found a non-significant inverse trend (P=0.12) between legume consumption and fasting glucose
Piombo, L., Nicoletta, G., Barbarossa, G., Tubili, C., Pandolfo, M. M., Castaldo, M.,	To test whether culturally tailored intervention, based on customized diet	sample size: 55 patients population of interest:	<p>Design: pre-post quali-quantitative study</p> <p>Method: 2 different semi structured questionnaire</p>	<ul style="list-style-type: none"> Patients food habits improved at 6-month follow up s <ul style="list-style-type: none"> number per patient of food categories 	<p>Strengths:</p> <ul style="list-style-type: none"> the first study to investigate the efficacy of culturally tailored diet with support of transcultural mediator

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<p>Costanzo, G., Mirisola, C., & Cavani, A. (2020). Outcomes of Culturally Tailored Dietary Intervention in the North African and Bangladeshi Diabetic Patients in Italy. <i>International journal of environmental research and public health</i>, 17(23), 8932. https://doi.org/10.3390/ijerph17238932</p>	<p>and transcultural mediator's support, can improve diabetic immigrants' food habits.</p>	<ul style="list-style-type: none"> 20-79 year old Bangladeshi and North African diabetic immigrants patients at the National Institute for Health Migration and Poverty (INMP-Italy) outpatient clinic first generation immigrants from Bangladesh, Maghreb and Egypt were recruited for the study and has diabetes 	<ul style="list-style-type: none"> baseline questions (25q) investigation. follow up questionnaire: additional 16 items aimed at analyzing customer satisfaction, adherence to diet and usefulness of transcultural mediation. Using a scale ranging from very low (1) to very high (5) there are 5 culturally oriented care model for foreign diabetic profiles designed according to traditional dishes 2 follow-up interviews and counseling: 3- month follow up and then 6-month follow-up 	<p>was reached and improved ($p < 0.001$)</p> <ul style="list-style-type: none"> Changes in food consumption assessed using McNemar's test, when significance was set to 0.05, the analysis reports results of cereal (0.60), meat (0.94) and potatoes (0.77) to be significant; y higher. 93% of patient reported positive life change 	<ul style="list-style-type: none"> study included multiple interdisciplinary teams to facilitate the study: nutritionist, diabetologist, medical dieticians, nurses, medical anthropologist, transcultural mediation Patients' culture and lifestyle were respected <ul style="list-style-type: none"> research done on creating the questionnaires in-depth interviews allow to better direct patient to a more customized food habit <p>Limitations:</p> <ul style="list-style-type: none"> Lack of sex balance <ul style="list-style-type: none"> most participants were males During the first follow-up, there were 25 drop-outs due to various reasons It was a short study, that does not see the effect of the intervention for a long period of time
<p>Vitale, M., Masulli, M., Calabrese, I., Rivellesse, A. A., Bonora, E., Signorini, S., Perriello, G., Squatrito, S., Buzzetti, R., Sartore, G., Babini, A. C., Gregori, G., Giordano, C., Clemente, G., Gironi, S., Dolce, P.,</p>	<p>To evaluate the relation of a Mediterranean dietary pattern and the individual components with the cardiovascular risk factor profile, plasma glucose and</p>	<p>Sample size: 2568 participants in 57 diabetes clinic</p> <ul style="list-style-type: none"> Study consisted for men and women with DM2, aged 50-75 years, with glycated Hgb 7.0- 	<p>Design: Cross-sectional</p> <p>Method:</p> <ul style="list-style-type: none"> Eating habits are assessed using a questionnaire that contains 248 items on 188 different foods. Participants were asked to tell how frequent the consumption of each item is. 	<ul style="list-style-type: none"> Study support Mediterranean dietary model is suitable for DM2 and the beneficial health effects of the diet lie in synergy among different nutrients. Higher adherence scores was found in females, older people and those living in the 	<p>Strengths:</p> <ul style="list-style-type: none"> the study has a big sample size. The study highlights in real-life clinical practice, dietary habits of people with DM2 One of the few studies done about exploring Mediterranean-lik dietary patterns on glucose control.

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Riccardi, G., Vaccaro, O., & TOSCA.IT Study Group (2018). Impact of a Mediterranean Dietary Pattern and Its Components on Cardiovascular Risk Factors, Glucose Control, and Body Weight in People with Type 2 Diabetes: A Real-Life Study. <i>Nutrients</i> , 10(8), 1067. https://doi.org/10.3390/nu10081067	BMI in people with DM2.	9.0% from centers throughout Italy.	<ul style="list-style-type: none"> The adherence to the diet was evaluated with the rMED score (relative mediterranean diet score) based on the intake 	southern regions of the country. <ul style="list-style-type: none"> HbA1c levels show a significant portion was found for fish 	Limitations: <ul style="list-style-type: none"> Data was only collected once Answers to the questions can be prone to recall bias The participants were likely using medications that could partly alter the quantitative effects