

Whether Plant-Based Diet (PBD) is effective in Preventing and Reversing Type-2 DM?

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Abstract

The consumption of whole-grain and legumes has been linked with increased glycemic control in diabetic and insulin resistant persons. According to Jenkins et al., (2003), “plant-based diets have proven to have some benefits in the management of type 2 diabetes. Many long-term cohort studies have indicated that the intake of whole-grain lessens the threat of developing type 2 diabetes and heart diseases”. According to Lee McKay & Ardern (2015), “even though patients with type 2 diabetes were conscious of the value of a plant-based diet, they did not implement it due to lack of health care providers failing to advocate it”. Patients showed a high willingness to adopt a plant-based diet educational interventions were necessary to apply it. According to Trapp & Levin (2012), is that a plant-based diet has less fat, calories, saturated fats and cholesterol compared to non-vegetarian diets. The American diabetes association has therefore recommended a “plant-based diet” for the cure and prevention of “type 2 diabetes”.

Keywords: *Whole grain foods, legumes, type 2 diabetes, prevention, and management*

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I. Introduction

The topic I wish to pursue is the role of a whole foods plant-based diet in preventing and reversing type-2 diabetes mellitus. Recent studies suggest that this novel dietary intervention might alleviate the risk and complications of type-2 DM. “The prevalence of type 2 diabetes is rising worldwide, especially in older adults. Diet and lifestyle, particularly plant-based diets, are effective tools for type 2 diabetes prevention and management” (McMaken et al, 2017). “Plant-based diets are eating patterns that emphasize legumes, whole grains, vegetables, fruits, nuts, and seeds and discourage most or all animal products” (McMaken & Shah, 2017). Additionally, eating a plant-based diet offers additional protection for obesity, hypertension, some cancers, and cardiovascular mortality. Therefore, it is argued that Plant-Based Diet could prevent and reverse DM and improve overall health (Campbell & Campbell, 2017).

Diabetes occurs when the body fails to produce insulin or when it fails to respond to the insulin produced in the body. As a result, the body cells cannot absorb and utilize glucose. Diabetes is the “seventh most common cause of death in the United States. Nearly 29.1 million people in the US have diabetes” (Barnard & Cohen et al., 2009). Diabetes increases the heart attack risk by two folds. It is also a leading cause of amputations of the lower limbs, kidney failure, and late-onset visual loss. Furthermore, the economic burden of diabetes is enormous. For instance, in 2012, the financial cost of diabetes was \$245 billion. “Noteworthy, the incidence of diabetes is on the rise in the country and globally” (McMaken & Shah, 2017). This increase has been attributed to the increasing rates of obesity, unhealthy diets and lifestyles. In the Bronx Community District 11, 14% and 32% of the adult population are diabetic and obese respectively. The average number of hospitalizations due to diabetes in this community is 335 per 100,000 adults. “Some of the risk factors for diabetes in this population include poor diet, smoking, and sedentary lifestyle” (McMaken & Shah, 2017). 17% of the adult population smoke

tobacco; 29% consume more than one 12 oz sugar beverages per day. 28% of the adult population does not participate in any form of physical activity (McMaken & Shah, 2017).

The burden of diabetes, on health and the economy, can be mitigated by putting appropriate measures on each of the transition points in the diabetes natural history. “These measures should aim at primary prevention, early diagnosis and treatment of diabetic patients, and rehabilitation to improve the quality of life” (McMaken & Shah, 2017).

II. Literature Review

Organic whole foods plant-based foods have always been a rare commodity due to the niceties drawn in in their “production and supply”. Organic whole foods plant-based foods are a little more expensive and less accessible making them available only in selected outlets. The rarity of such foods in some major towns has led them to be declared as ‘food deserts’. Some towns exhibit dire shortage of organic foods due to the custom and culture of the popularity of fast foods. Getting organic foods in a regular store today is hard due to the many competitive price differences offered by conventional foods (Harland & Garton, nd). Moreover, the fact that conventional foods are easily accessible has made most stores to stock mostly conventional foods on their shelves. However, as people continue to get sensitized to the health benefits of organic foods, their desire for this category of foods is ever increasing. As a result, more and more stores are taking up the idea of stocking organic foods on their shelves. Despite this, there is still a relative shortage of organic foods in most outlets making accessibility a little difficult when compared to conventional foods.

Jenkins, D. J., Kendall, C. W., Marchie, A., Jenkins, A. L., Augustin, L. S., Ludwig, D. S., ... & Anderson, J. W. (2003). Type 2 diabetes and the vegetarian diet. *The American journal of clinical nutrition*, 78(3), 610S-616S.

According to Jenkins et al., (2003), a “plant-based diet” has proven to have some benefits in the management of “type 2 diabetes”. The consumption of whole-grain and legumes has been linked with increased glycemic control in diabetic and insulin resistant persons.

According to Jenkins et al., (2003), many long-term cohort studies have indicated that the intake of whole-grain lessens the threat of developing type 2 diabetes and heart diseases.

This source will help in supporting my hypothesis that tries to investigate whether a whole foods plant-based diet can prevent and reverse diabetes. The source is essential since it will provide significant insights into the hypothesis due to its evidence-based information.

Lee, V., McKay, T., & Ardern, C. I. (2015). Awareness and perception of plant-based diets for the treatment and management of type 2 diabetes in a community education clinic: A pilot study. *Journal of nutrition and metabolism*, 2015.

Lee McKay & Ardern (2015) conducted a study to determine awareness and perception of a “plant-based diet” for the management and control of “type 2 diabetes” in a certain community in Canada. The outcome from the research pointed out that only “9% of the respondents who were suffering from diabetes followed a plant-based diet. 66% of the respondents were prepared to consume a plant-based diet for three weeks. On the other hand, 72% of healthcare workers understood the importance” (Lee, McKay & Ardern, 2015) of a “plant-based diet for the management of diabetes”; nonetheless small levels of practice were

discovered. They concluded that since patients showed a high willingness to adopt whole foods plant-based diet educational interventions were necessary.

This source is important in supporting the hypothesis because it will provide quality and extensive information regarding education, awareness, and view of plant-based diets in the cure and control for type 2 diabetes.

McMacken, M., & Shah, S. (2017). A plant-based diet for the prevention and treatment of type 2 diabetes. *Journal of geriatric cardiology: JGC*, 14(5), 342.

According to McMacken & Shah (2017) is that plant-based diets, which include the consumption of whole grains, legumes, vegetables, fruits, seeds, and nuts without the intake of animal products, decrease the danger of increasing type 2 diabetes. Observational and interventional research has shown that plant-based diets play a great role in treating type 2 diabetes. A plant-based diet also reduces major diabetes linked macrovascular and microvascular problems.

This source will also help in supporting the hypothesis that whole foods plant-based diet can prevent and reverse diabetes at the cellular level. It will provide necessary scientific data and reliable information that holds up the use of a “plant-based diet” in dealing with type 2 diabetes.

Trapp, C., & Levin, S. (2012). Preparing to prescribe plant-based diets for diabetes prevention and treatment. *Diabetes Spectrum*, 25(1), 38-44.

Plant-based diets have been welcomed in the recent days since it was supported by the US Department of agriculture 2010 Dietary guidelines. It has broadly studied the effect of “plant-based foods” for weight control and the inhibition of disease and treatment. According to

Trapp & Levin (2012), is that a plant-based diet has less fat, calories, saturated fats and cholesterol compared to non-vegetarians. The American diabetes association now recommends a plant-based nourishment in the deterrence and cure of diabetes.

This source has an abundance of information that will help in providing supporting evidence in support of my hypothesis indicating that dietary quality should be the focal point of “type 2 diabetes” prevention and cure.

a) Reason of Interest

“The increased prevalence of Diabetes Mellitus (DM) over the past few decades has raised significant concerns across healthcare professionals worldwide. There is a lot of credible scientific proof that links rise in the incidence of coronary heart disease (CHD), cancer and type-2 diabetes, to increased “non-plant-based foods” consumption. This, in turn, provides “indirect support for consumption of a plant-based diet” (McEvoy, Temple, & Woodside, 2012). These diseases are among the greatest causes of death not only in the United States but the world over.

Arguably, if a majority of the world's population adopted a plant-based diet, morbidity and mortality arising from these terrible illnesses would be reduced, in turn translating to an increased life expectancy for most of the nations in the world. This is the biggest point for a plant-based diet because together, these three groups of diseases take very many lives prematurely. If a plant-based diet can prevent them, then it can save the world so many resources lost in the treatment of these disorders and finally at the cost of losing so many people.

Plant-based diets help in preventing a broad range of other diseases. These include overweight and obesity, gallstones, hypertension, kidney stones, diverticular disease and constipation (Marsh, Zeuschner, & Saunders, 2012). These conditions not only affect the “health status of the individual” but also the general quality of life. So many aspects of health are affected by the diet

that it is possible that research has not yet quite grasped the full extent to which plant-based diets improve health. The mental-health benefits of plant-based diets, for example, have only been scratched on the surface. Despite vegetarians having a lower Body Mass Index (BMI) than non-vegetarians and a higher sense of health awareness as compared to non-vegetarians, clinical outcomes remain better for vegetarians after these factors are taken into account (Marsh, Zeuschner, & Saunders, 2012). This is indisputable scientific proof that plant-based diets offer health benefits superior to those provided by meat-based diets.

The health gains of a “plant-based diet” are not restricted to people in good health only. Some authorities have claimed that “plant-based diets” can be helpful in curing certain diseases. However, there are well-documented benefits of a “plant-based diet” in particular disease states. For example, chronic kidney disease (CKD) is an illness that requires tight dietary regulation. Too much animal protein imposes a heavy phosphorous load on the body, which cannot be efficiently excreted since the kidneys, whose function is to regulate phosphorous levels in the body, are failing. Too much phosphorus may cause hyperparathyroidism and bone disease and promote cardiovascular illnesses (Kalantah-Zadeh, et al., 2010). High dietary phosphorus increases mortality. Plant-based phosphorous is less bio-available due to less gastrointestinal absorption. In CKD, therefore, plant-based diets are helpful in reducing a lot of undesirable outcomes.

Some people have challenged the position that plant-based diets are useful by pointing to the many problems faced by pure vegetarians. Several studies suggest that vegetarian diets may lead to changes that adversely affect the body. These include anemia, hyperhomocysteinemia, low muscle creatinine content, protein deficiency, and problems with menstrual cycle in females (Pilis, Stec, Zych, & Pilis, 2014). This may result in a reduction in the ability to engage in

physical activities. Another argument advanced in defense of meat-based diets is the micronutrient deficiencies suffered by people who are wholly reliant on plant-based products only. Vegetarian diets may make it difficult to obtain such nutrients as cobalamin, zinc, iron, calcium and essential fatty acids (Marsh, Zeuschner, & Saunders, 2012). This argument is countered by the single suggestion that to overcome the possibility of such nutrient deficiencies, controlled supplementation is required without actually requiring a person to revert to a meat-based diet.

Type-2 DM predisposes the risk of different cardiovascular disorders. Uncontrolled diabetes mellitus is associated with other complications including nephropathy, retinopathy, and neuropathy. Such complications often lead to end-organ failure and increase the risk of mortality in individuals (Kahleova and Matoulek et., al 2013). Healthcare professionals and scientists continually seek innovative and effective approaches for managing DM. While hypoglycemic drugs are effective in temporarily managing DM, tolerance can reduce their long-term efficacy. In type-2 DM, a stepwise escalation of therapy is suggested along the course and progression of the disease (Gallwitz, et al., 2013). For this reason, healthcare professionals and patients alike have reasons for concern regarding continual dosage titration of hypoglycemic agents and the implications on long-term health outcomes. The present study would explore the role of “plant-based diets” in diminishing the risk of uncontrolled DM.

b) Target Audience

The target population for the proposed study would include patients suffering from uncontrolled type-2 DM. Novel dietary interventions such as plant-based diet may ensure tight control of blood sugar in this targeted population. The planned intervention might benefit individuals who are refractory to hypoglycemic agents. A quantitative study would be conducted to compare the outcomes of the participants receiving the interventions. “The aim of this review

is to assess the effects of vegetarian diets, particularly strict vegetarian diets (*i.e.*, vegans) on health and disease outcomes” (Le, et al., 2014). Participants would be randomly assigned to three experimental groups. All study participants should be diabetics and belong to the age-range of 40 to 50 years of age. The study population would include both male and female participants from diverse ethnic, religious, socioeconomic, and cultural backgrounds. The first experimental group would receive only oral hypoglycemic medications as prescribed by their physician. The second experimental group would receive a combination of oral hypoglycemic medication and plant-based diet. Finally, the third experimental group would only consume a plant-based diet.

c) Problem statement

The proposed study would explore whether “Plant-Based Diet (PBD) is effective in Preventing and Reversing Type-2 DM”.

d) Research Questions

The proposed study would explore one main research question and seven sub-research questions (SRQs). The SRQs would help to address the main research question across-the-board.

Main research question
Whether A Plant Base Diet is effective in preventing and reversing type-2 DM?
Sub-research questions
Whether A Plant Base Diet significantly lower blood glucose levels in diabetics?
Whether A Plant Base Diet significantly lowers glycosylated hemoglobin levels (Hb1Ac) in diabetics?
Whether A Plant Base Diet significantly improves insulin levels in diabetics?
Whether A Plant Base Diet significantly reduces the risk of nephropathy, neuropathy, and

retinopathy in diabetics?
Whether A Plant Base Diet is effective alone or in combination with oral hypoglycemic drugs in reducing blood glucose levels?
Whether A Plant Base Diet significantly increases the risk of CVD and dyslipidemia in diabetic patients?
Whether consumption of A Plant Base Diet is associated with more adverse effects compared to oral hypoglycemic medications?

Table 1: “The research questions and their respective hypothesis”

e) Hypothesis Testing

Both the main and sub-research questions would be interpreted based on the acceptance or rejection of the null hypothesis (H_0) or the alternative hypothesis (H_a) respectively. Presented in table 1 are the “research questions” and their respective “hypothesis”. The H_0 states that “there is no difference between methods or correlation between two observations” (Barnard & Cohen, 2006). Any noted difference or correlation is attributed to chance factors of random sampling. The claim that is on trial the H_0 has accepted if the p-value for the statistical test of interpretation is greater than 0.05. The H_a contends that “there is a significant difference between the methods or correlation between two observations” (Satija et al., nd). Any noted difference or correlation is not attributed to chance factors of random sampling (Tonstad et al., 2009). The H_a is accepted if the p-value for the statistical test of inference is less than 0.05. Thus, the H_0 for the proposed study contends that plant-based diet is not effective in preventing and reversing type-2 DM. Likewise, the H_a for the proposed study contends that a plant-based diet is effective in preventing and reversing and type-2 DM.

Identification of Variables and Interpretation of Relationship

The final stages and interventions are related to the research questions that were framed for the proposed study. Parameters include fasting blood glucose levels, Hb1Ac levels, history of adverse effects, and incidences of cardiovascular mortality and morbidity. The intervention that would be explored in the proposed study is a plant-based diet. “A healthy, plant-based diet aims to maximize consumption of nutrient-dense plant foods while minimizing processed foods, oils, and animal foods (including dairy products and eggs)” (Tuso, et. al., 2013). “It encourages lots of vegetables (cooked or raw), fruits, beans, peas, lentils, soybeans, seeds, and nuts (in smaller amounts) and is generally low fat” (Tuso, et. al., 2013). Inferential statistics such as the “Mann-Whitney U test” and the Student’s t-tests would be undertaken to report the findings of the proposed study. The IBM-SPSS software would conduct all statistical calculations for this research study.

III. Analysis of the Data

The implementation of a whole foods plant based diet will prevent and reverse type 2 diabetes mellitus. The social consequences of choosing one dietary path may be more profound than anticipated. Vegetarians, for example, might face some unprecedented social difficulties when visiting non-vegetarian hosts. Ecological concerns of dietary preferences are also increasingly becoming a center of scientific focus, with the realization that meat-based diets are putting quite a tremendous amount of pressure on natural resources. Most scientific studies have supported the statement that a whole foods plant-based diet (WFPBD), as well as nutrients obtained from plant-based food substances, make a vital contribution to the reduction and prevention of risk factors associated with type-2 diabetes. McMacken & Shah 2017 present the argument that the type of diet chosen by people suffering from diabetes has significant impacts on their body’s insulin resistance. As a result, individuals with type 2 diabetes have to make

careful dietary decisions. Foods from animal products and processed foods that are rich in calories have the ability to increase the prevalence of person with diabetes. Following such, McMacken & Shah (2017) state that it is advisable for type 2 diabetes patients and elderly individuals to consume plant-based diets to reduce complications related to and prevent type 2 diabetes respectively. The article also states that consuming plant-based foods can minimize the risk factors for diabetes such as hypertension, inflammation, and obesity. Preferred for diabetes patients is a plant-based diet that leads to improvement in health overall.

a) The validity of the Data and Findings

Data provided by the article relating to the role plant-based foods play in preventing diabetes is valid. McMacken & Shah (2017) incorporated findings from various cohort studies, all of which supported the claim that plant-based diets are essential for improving the health of type 2 diabetic patients. These cohort studies also supported the claim that consumption of animal and refined foods enhanced the risk for “type 2 diabetes” and related complications. Further, the nutrient components of plant-based diets tend to improve insulin resistance in the body, which makes them preferable for type 2 diabetes patients as well as other at-risk populations (McMacken & Shah, 2017). What is not advisable for people with diabetes are foods such as meat and other processed foods that tend to have higher-fat and sugar components, and correspondingly, increases the risk for cardiovascular disease.

b) Relevance to Problem Statement

This source adequately addresses my problem statement since it incorporates information on the relationship between whole foods plant-based diets and type 2 diabetes. Since my problem statement involves the argument that a whole foods plant-based diet can prevent and reverse diabetes, the findings presented by this source can support or refute my claim, because it

includes a similar topic of study. Further, the source comprises a secondary review of literature from previous researches that are related to my area of interest. As a result, the findings from the research will provide more insight into my topic and provides information on the impacts of consuming meat products and processed foods. All of which will confirm my problem statement on whether or not the incorporation of a WFPBD is suitable for people with diabetes.

c) Personal Contribution to the Topic

Although my source addresses various areas related to the prevention and maintenance of type 2 diabetes, it does not provide information on whether plant-based diets have any negative impacts on the patient's body (McMacken & Shah, 2017). In some cases, plant-based foods can be essential for patients with type "2 diabetes" but have the "potential" for other undesirable health outcomes if not adhered to. For instance, plant-based diets can theoretically fail to provide a patient's body with enough protective nutrients, such as vitamin B12, zinc, and iron, which can expose them to other diseases. Similarly, the source does not include information on whether there are some situations where diabetes patients have to add other foods besides plant-based diets.

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