Abstract

This integrative literature review assessed the connection among various studies conducted on the relationship between participants on plant based diets and the recent effects on their health. Before medicine and technology, infectious diseases were the primary cause of death. As innovations in science and medicine progressed, the trend of diseases shifted from infectious to chronic. Currently, the foremost health issues in our society are almost all chronic and related to lifestyle choices. Despite copious amounts of money being poured into research and new drugs to improve our health, people are dying from chronic diseases now more than ever before. These chronic diseases include obesity, hypertension, stroke and diabetes. A renaissance in research transpired as studies took a different turn, focusing more on natural solutions to prevent these chronic diseases, such as plant based diets. An integrated literature

Introduction

Diabetes Mellitus, also known as Type 2 Diabetes (T2D), is one of the major chronic as well as rapidly growing public health issues not only in the United States but throughout the world. An approximated 382 million adults worldwide had diabetes in 2013; this number is projected to rise to 592 million by 2035, (Kahleova et al, 2017) almost doubling the number of diagnoses in about 20 years.

in managing complications of T2D through a reduction in Hemoglobin A1C (HbA1c), body mass index (BMI) and lipid index. The reduction of these factors as the outcome for these studies indicates that there is substantial and similar evidence indicate that a plant based diet can reduce and potentially prevent T2D.

History of Communicable Diseases

For as long as there has been life on earth, diseases have existed. As science and technology advanced overtime, mankind has been able to identity, combat, treat and learn to prevent certain diseases. The majority of the diseases that were of primary concern in our history were communicable diseases otherwise known as infectious diseases. The bubonic plague and other infections like measles and smallpox were among the most devastating of the epidemic diseases. Before science and medicine advanced, infectious diseases took the lives of millions of people. The smallpox epidemics alone have killed millions of people. The most infamous epidemic was the smallpox epidemic in 1519 when Cortes and his European explorers introduced the diseases to the native population of the Aztec Empire. ("Deadly Diseases: Epidemics throughout History," 2014). The epidemic ended up killing between 5-8 million people over the course of only two years ("Deadly Diseases: Epidemics throughout History," 2014). Exactly a century ago, the United States was one of the numerous countries plagued by the flu epidemic of 1918 and 1919. ("Deadly Diseases: Epidemics throughout History," 2014). This flu epidemic killed approximately between 30 million and 50 million worldwide and among those, over half a million were Americans ("Deadly Diseases: Epidemics throughout History," 2014). Specifically, in the United States, the flu, smallpox, polio and HIV are the diseases that had the deadliest outcomes.

For centuries, communicable diseases were the most prevalent form of disease that affected the majority of the population. The demand for a way to combat the diseases and the epidemics stimulated advances in medicine and science. Through research, mankind has been able to successfully understand the mode of transmission and the path that the microorganism takes in the body as it progresses and the specific signs and symptoms that are distinguishable in certain diseases. Mankind has learned how the disease occurs, how to treat but most importantly, ways of prevention. The breakthrough in primary prevention in the form of vaccines and hand hygiene led to a massive and radical reduction in the number of new cases of communicable diseases including resultant deaths. During the 20th century, deaths due to infectious diseases declined drastically in the United States. This decline contributed to a sharp drop in infant and child mortality and a 29 year increase in life expectancy. At the beginning of the twentieth century,

accounted for nearly 46% of all deaths ("According to Chronic Disease Overview," 2017). According to Turner-McGrievy, overweight and obesity are increasingly problematic in the United States, where two-thirds of the adults are overweight or obese and the prevalence of T2D among this population is 9.3%.

Overview of Type 2 Diabetes

T2D is a significant chronic disease with an increasing prevalence rate worldwide. T2D results when the body does not produce enough or cannot properly use the insulin it produces (Asif, 2014). It is the leading cause of premature deaths and when improperly managed, it can lead to a number of health issues, including heart disease, stroke, kidney disease, leg and foot amputations, blindness, nerve damage and death (Asif, 2014). It is not only a dangerous condition when not properly controlled but also it presents many challenges, financially, since it is expensive to treat and manage. Obesity and other co-morbidities are strongly associated with a patient who also is diagnosed with T2D.

Diabetes branches off into various types. Type 1 Diabetes is also known as juvenile diabetes and insulin dependent diabetes, as it is typically diagnosed when a patient is still a child and the individual is dependent on an exogenous source of insulin for the remainder of his/her life. It is a chronic condition, specifically an autoimmune condition in which the pancreas produces very little to no insulin. (Asif, 2014). Type 1 Diabetes constitutes less than 5% of the total cases of diabetes (National Institute of Diabetes and Digestive and Kidney Diseases, 2016). T2D or adult-onset diabetes is different in comparison to Type 1 Diabetes, as the pancreas produces insulin but the body does not use the insulin properly. The most common type of diabetes, Type 2 usually begins when a person is in his or her mid-50s. T2D is heavily influenced by lifestyle factors as opposed to an autoimmune disease. While all types of this

illness are chronic, T2D is more preventable as it develops with co-morbidities and develops through environmental and lifestyle factors. Certain aspects in one's life can greatly increase the chances of getting this disease, with obesity and physical inactivity constituting the top reasons for the increasing burden that diabetes has in the developed world (Asif, 2014). Diabetes has become such a prevalent issue in our society. Despite availability of the wide range of pharmacological treatments and diabetes education from certified diabetic educators and other health care professionals, good control of diabetes and its comorbidities remains difficult (Trapp and Levin, 2012). The creation of the American Diabetic Association (ADA) diet and the use of synthetic insulin have proven to be helpful but not effective in managing the condition and preventing further damage. Attempts to comply with the "diabetic diet" tend to result in unnecessary restrictions of the wrong foods and overindulgence or monotonous consumption of certain food items (Asif, 2014). It is believed that this is due to the many misconceptions about what a diabetic can and should eat. A diet that has demonstrated effectiveness in managing diabetes, reducing BMI, lipid levels and the high blood sugar levels and therefore, the high A1C levels is the vegan diet.

Veganism

Veganism is characterized as a lifestyle that excludes the consumption and use of all animal products. A vegan diet differs from the vegetarian diet, as vegetarians are defined as people who do not eat meat, poultry or fish, whereas dietary vegans refrain from consuming animal products, not only meat but also eggs, dairy products and other animal derived substances (Appleby & Key, 2015). This diet is also known as a plant-based diet as the foundation of the diet is based on a wide variety of whole plant foods: fruits, vegetables, whole grains, legumes, nuts and seeds. A healthy plant-based diet is one that aims to maximize consumption of nutrient-

dense plant foods while minimizing processed foods, oils, and animal foods, including dairy products and eggs (Hart, 2015).

High-Fat Diet and T2D

Many people are knowledgeable that T2D is an acquired disease, a chronic condition caused by several factors, including lifestyles and genetics. Specifically, a particular lifestyle factor is diet, a high-fat diet. Many believe and argue that a high-carbohydrate diet is one of the causes of T2D since a carbohydrate is broken down into sugars for the body to use. However, a high-fat diet has a different effect on the body at a cellular level, and is the root cause of insulin resistant cells. What is not known to most people is that, as the amount of fat in the diet goes up, so does the blood sugar (Imatome-Yun, 2015). When a person eats, starches are broken down into glucose and it circulates as blood glucose or blood sugar (Imatome-Yun, 2015), where then the carbohydrates are taken up by the muscles to be stored and burned for energy. Blood sugar cannot go into the cell alone; it needs the help of insulin to move intracellularly. Imatome-Yun uses the analogy of a key and a door when describing how insulin works at the level of the cell. He states that insulin is like a key that unlocks the door to let sugar from our bloodstream into the cell. Without insulin, blood sugar will remain in the bloodstream without any way to get into the cell, so with nowhere to go, blood sugars will therefore, rise (2015). Specifically, for T2D, the insulin is produced and it is outside the cell, but it does not work properly as a facilitator of glucose transport as it should, therefore cells are deemed insulin resistant. Muscle cells can also become resistant to insulin. The fat inside the muscle cells is the reason why insulin is not as effective. The excess fat residing in the bloodstream can build up inside cell, thus causing toxic fatty break down and free radicals. As a result, these free radicals can and do block insulin. No matter how much insulin is in the blood, it will not work as effectively, therefore resulting in i reV(ve)4htng i(oo

into the muscles (Imatome-Yun, 2015). This inhibition can cause an elevation in blood sugar in as little as 3 hours. Many people assume that a diet high in carbohydrates will lead to acquiring diabetes. This is inaccurate, as we need sugar for our body to function. The sugar that is naturally found in food and the carbohydrates that we eat cannot be used when fat from a typical meat-based, animal-based diet is leading to an increase in the amount of fat in the blood. Ultimately, an increase in fat in the blood is a significant contributor to insulin resistance.

Measurements of Weight

This discovery of the correlation between a high-fat diet and increase in blood sugar levels explains obesity as a comorbidity of T2D. A diagnosis of overweight or obese is the single best predictor of also developing T2D. A person who is overweight or obese has a higher fat content in his/her body as well as the diet, which increases the chances of developing T2D. The diagnosis of overweight or obesity is determined by calculating the BMI. A normal BMI ranges from 18.5- 24.9 for both men and women. Based on the BMI, a person would be overweight if he/she had a score of anywhere between 25- 29.9 and a person with a BMI of a score of 30 or more would be classified as obese. The BMI indicates that a person's weight is disproportional to his/her height, due to excess amount of fat and suggests that weight might increase the risk of health problems, such as heart disease, diabetes and cancer.

BMI and T2D

Being obese has serious health consequences, as it is associated with an increased risk of T2D, cardiovascular disease, hypertension and certain cancers. Studies have shown that vegetarians and vegans have a generally lower BMI in comparison to omnivores as well as a lower prevalence of obesity and other chronic diseases. In one particular study, the objective was to determine whether a plant-based diet was a major contributing factor to a decrease in

BMI. The participants chosen all had a BMI of greater than or equal to 25. The control group, which also consisted of participants with a BMI of over 25, was instructed not to make any dietary or physical activity changes. Both groups had almost a similar amount of participants each, with 142 in the intervention group and 149 in the control group. As the control group, they were asked to remain constant in their diet and other lifestyle patterns. The participants in the intervention group were asked to follow a low-fat, vegan diet over the course of 18 weeks. Their diets were to compose of whole grains, vegetables, legumes and fruits only, avoiding animal products and to minimize added oils as much as possible. The participants in this group were educated on the healthy, vegan options in their workplace also on topics like the effect of diet on weight loss, diabetes, heart disease and cancer. Both groups were assessed physically at week 0 and week 18, the final week. Each participant's body weight, blood pressure and plasma cholesterol was measured. At the end of the 18 weeks, mean body weight decreased by 3kg in the intervention group and 0.06kg in the control group (Mishra et al, 2013). In terms of BMI, the mean BMI of the intervention group dropped by 1, whereas the mean BMI for the control group dropped by 0.01 (Mishra et al, 2013).

Participants in the intervention or vegan diet group also saw significant decreases in the total cholesterol, blood level and HbA1c levels. The study concluded that with a plant-based diet intervention, there was a significant weight loss. This randomized, controlled trial indicated that a vegan diet intervention yielded significant improvements in body weight and therefore, BMI, as evidenced by a greater weight loss demonstrated in the participants in the intervention group as opposed to the control group whose diets remained constant (Mishra et al, 2013). The study also concluded that as the only factor, a plant-based diet was still effective in weight loss, even in the absence of caloric restriction and exercise, thus demonstrating the efficacy of a plant-based

diet. In 18 weeks, on diet alone, participants were able to lose a significant amount of weight and decrease their BMI. One could argue that if the intervention group maintained

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that shows the industry pushing for primary prevention of these chronic illnesses. While primary prevention through diet and other various lifestyle choices can affect a person's chances of developing a chronic illness, there is still a heavy emphasis in the healthcare industry for physicians and specialists to treat patients when they are already sick and diagnosed with a disease. The interventions that are still mostly used today are machine heavy, in which radical surgical procedures and pharmaceutical involvement are suggested first rather than a change in diet. As our society has grown and developed with technology, so has our desire for instant gratification. If there is a problem, people want the fastest solution, which may not necessarily be the safolutsolut

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Ultimately, every individual has the choice to make the right dietary changes that can result in positive health outcomes.

All across the world, and in particular, the United States is in the midst of a chronic disease epidemic. It is projected that over the course of the next couple of decades that one third of Americans will be diagnosed with diabetes. This includes children and the younger generation, which will result in shorter lifespans. The link between an animal-based diet is undeniable. Eating sugar will not cause plaque to form in vessels, as excess sugar is stored as glycogen. It is the processed meats that are riddled with saturated fats that will result in plaque formation and an increase in cholesterol levels. The focus on sugar and the irrational belief that ingesting high amounts of sugar will lead to diabetes has taken the focus off of the real issue, which is the significant effects of meat and dairy on the body. The various studies reveal concrete evidence of the positive systemic effects that a plant-based diet possesses. There are various facets and components of a plant-based diet that definitively show positive effects on hyperglycemia and the improvement of T2D. The current approaches to combating this chronic disease epidemic are clearly not working and the trend of an increase in these chronic diseases will continue if the proper and most effective interventions are not emphasized and implemented. Chronic diseases, like T2D do not have to be the fate for Americans. The multiple peer-reviewed studies show that a low-fat plant-based, vegan diet is shown to be powerful and effective in controlling and even reversing multiple chronic diseases. The health of those following a vegan diet has been shown to be significantly enhanced than those who incorporate meat and animal-based products into their diet. The proof is in the plants; the studies show that society can not only survive on a purely vegan, plant-based diet, but also that we can thrive.

Addendum

Sample of Vegan Menu for One Week

Dinner: Pan-seared Gardein fillet with shiitake mushroom sauce; mashed potatoes and braised Brussels sprouts

Friday:

Breakfast: Brown rice (I make several days' worth at a time), chopped dates, almonds, nondairy milk poured over

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