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The Hemoglobin A1C of African-Americans/Blacks with Diabetes Mellitus Type Two Using Low-Fat Diabetes Plate Diet

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ABSTRACT

THE HEMOGLOBIN A1C OF AFRICAN-AMERICANS/BLACKS WITH DIABETES MELLITUS TYPE TWO USING LOW-FAT DIABETES PLATE DIET

by

Ednah K. Makori

Chair: Carol Rossman, DNP, APRN-BC

ABSTRACT OF GRADUATE STUDENT RESEARCH

Dissertation

Andrews University

School of Health Professions

Title: THE HEMOGLOBIN A1C OF AFRICAN-AMERICANS/BLACKS WITH DIABETES MELLITUS TYPE TWO USING LOW-FAT DIABETES PLATE DIET

Name of researcher: Ednah K. Makori

Name and degree of faculty chair: Carol Rossman, DNP, APRN-BC

Date completed: May 2019

Diabetes Mellitus type two (DMT2) is a chronic disease that leads to high blood sugar in the body and if not corrected over a period of time, it leads to development of complications. Some of those complications include blindness, kidney failure, and retinopathy, among others. DMT2 continues to affect many people in the USA, especially African-Americans/Black who have the highest prevalence as compared to other races. Proper diet management especially the *Low-Fat diabetes diet* helps to decrease Hemoglobin A1c, which could result in reduction of risk of developing complications and morbidity related to DMT2. This project was done to educate African-American/Black population in Benton Harbor Health Center with DMT2 on *Low-fat diabetes diet.* The results indicated a significantly lower hemoglobin A1c and BMI

among patients that were in the experimental group who had education intervention as compared to those who were in the control group and did not receive any diet education. This project took place over three months for each participant and pre-test and posttest measures were reported for HbA1C, BMI, as well as fat-related diet knowledge.

Andrews University

School of Health Professions

THE HEMOGLOBIN A1C OF AFRICAN-AMERICANS/BLACKS WITH DIABETES MELLITUS TYPE TWO USING LOW-FAT DIABETES PLATE DIET

A Project Document

Presented in Partial Fulfillment of

the Requirements for the Degree

Doctor of Nursing Practice

by

Ednah K. Makori

May 2019

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APPROVAL BY THE COMMITTEE:

Chair: Carol Rossman

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6 - 5 -2019 Date approved

DEDICATION

I thank God for Andrews University for giving me this opportunity to pursue a terminal degree in Doctor of Nursing Practice. I thank Him for the Nursing Department, from the Department Chair, Dr. Jochebed Bea Ade-Oshifogun to the other faculty and staff who made this journey worth the call of becoming an Advanced Practitioner. My sincere appreciation goes to my supervisor and DNP program chair, Dr. Rossman, for ensuring this project was completed. I appreciate tireless input from the statistician, Dr. Tevni Grajales, who made it possible for the "numbers" in this project to be well interpreted. I could not have successfully completed this project without his input.

Outside the Andrews Community, I would like to thank Dr. Donnald Tynes for allowing me to conduct this project in his Benton Harbor Health Center. This African-American missionary doctor became my mentor. His dedication to a marginalized African-American/Black community gave me a lot of hope and inspiration. His expertise in internal medicine, more so in diabetes, becomes a handy resource when I most needed his guidance. The staff at the Benton Harbor Health Center was so supportive in ensuring that this project was well done. I thank them all for that spirit.

My personal appreciation goes to my family and children—Jennifer, Rebecca, George Jr.—for their patience and support especially during the many hours I was gone from home in order to accomplish this academic endeavor. May God bless them all.

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LIST OF ABBREVIATIONS

ADA- American Diabetes Association.

BHHC-Benton Harbor Health center.

BMI- Body Mass Index.

CDC-Centers for disease control and prevention.

DM- Diabetes Mellitus.

DMT1- Diabetes Mellitus type one.

DMT2- Diabetes Mellitus type two.

DPP-1V-Dipeptidyl peptidase-4

FPG- Fasting blood glucose.

GI-Gastrointestinal.

GLP-1-Glucose-like peptide-1 receptor agonist.

HbA1c- Glycated hemoglobin

HBA1c- Glycated hemoglobin

HDL-High-Density Lipoproteins.

HgbA1c- Glycated hemoglobin.

2-HPG-2 hour post challenge plasma glucose.

LDL-Low-Density Lipoproteins.

NAFER-National Association of Federal equity receivers.

NCD-Non-communicable diseases.

OGTT-Oral glucose tolerance test.

SPSS-Statistical Package for Social Sciences.

T2DM-Type two Diabetes Mellitus.

WHO-World Health Organization.

ACKNOWLEDGEMENTS

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CHAPTER 1

THE HEMOGLOBIN A1C OF AFRICAN-AMERICANS/BLACKS WITH DIABETES MELLITUS TYPE TWO USING LOW-FAT DIABETES PLATE DIET

Introduction

Diabetes is a problem that occurs in the body when the blood sugar rises higher than normal according to American Diabetes Association (ADA) (2017d). If not well controlled, the rise in blood sugar can lead to many complications such as hyperglycemia, high blood pressure, high low-density lipoprotein (LDL), blindness and eye problems, kidney disease, amputations, nerve diseases, hearing loss, erectile dysfunction, gum disease, depression, heart disease, stroke, and pregnancy complications (National Diabetes Statistics Report of the National Center for Chronic Disease Prevention and Heath Promotion, 2014). Obesity is the most important environmental factor that causes insulin resistance; hence, the best way to manage diabetes is through a *Low-fat diabetes diet* that has been recommended for diabetics (Papadakis McPhee, & Rabow, 2017).

Overview of the Problem

Diabetes mellitus (DM) continues to be a major problem in America despite the advancement in diagnosis and management (Jones et al., 2006). It has been estimated that 29.1 million people, which is 9.3 % of the population in the United States, have DM

(Papadakis et al., 2017). Diabetes mellitus type two (DMT2) is a chronic progressive disease and its impact on individuals, populations and public health is increasing (Rise, Pellerud, Rygg, & Steinsbekk, 2013). Diabetes may be underreported as a cause of death since only 35% to 40% of people with diabetes who died had diabetes listed on their death certificate, while only 10% to 15% had it listed as an underlying cause of death (National Diabetes Statistics Report of the National Center for Chronic Disease Prevention and Heath Promotion, 2014).

Problem Statement

Patients who have been diagnosed with DMT2 are not receiving adequate diabetes diet education on a regular basis. This contributes to poor food choices and unhealthy eating habits, hence an increase in blood sugar, obesity and other complications. A survey done by Ball, Hughes, Desbrow, and Leveritt (2012) revealed that patients with DMT2 are not receiving nutrition education as often as they should and that is why the issue has to be addressed more promptly than ever before.

Significance of the Problem Statement To Advanced Practice Nursing

In healthcare, DMT2 has been identified as one of the national chronic diseases (NCDs) responsible for 82% deaths in the world. In addition, more people worldwide are predicted to be diagnosed with DMT2 by the year 2035(WHO Fact Sheet, 2015). This project was done to educate African-American/Black population with DMT2 on the *Low-fat diabetes diet.*

In advanced practice nursing, the ADA (2017b) recommends that all individuals diagnosed with DM should immediately receive continual diabetes diet education, but

many primary care providers are hardly meeting this expectation as per ADA (2015). Lack of diabetes diet education contributes to increased sugar readings and obesity among patients with diabetes, hence a poor disease prognosis. Currently, a minority of diabetic patients receive diabetes diet education and only 6.8% of patients with private health insurance and 4% of patients with Medicare insurance participated in a structured diet education program (ADA, 2017b).

Vegetables and leguminous plants such as soybeans, and other beans may interfere with the metabolism of glucose, thus displaying anti-diabetic activity (Getek, et al. 2014). When these vegetables and legumes are consumed consistently in the diet, the patient will have more controlled blood sugar. Nurses and advanced primary care practitioners should work together to ensure that patients are given this information at every visit so that the patient can understand the importance of adhering to the *Low-fat diabetes diet*.

Purpose of the Study

The purpose of this project is to educate patients with DMT2 on the *Low-fat diabetes diet*. The aim of the study is to demonstrate measurable improvements in Body Mass Index (BMI) and Hemoglobin A1c (HBA1c) level after the implementation of education intervention as compared to pre-education measures.

Pico Question

Will African-Americans/Black with DMT2 who participate in *Low-fat diabetes* plate education sessions (3) have a lower HbA1c, lower BMI measurement and lower sum scores on the Five Fat-lowering Factor tool as compared to those who will not?

Background

DMT2 is a condition of high blood sugar, and the elevated blood sugar brings about complications both to health and economy. Buttaro, Trybulski, and Sandberg-Cook (2017) have identified diabetes as the leading cause of cardiovascular disease, renal failure, blindness, and non-traumatic lower-limb amputation. These complications are caused by an increase in the HbA1c level (average blood glucose level over the past two to three months) a fact that contributes to the urgency of the *Low-fat diabetes diet* education.

African-Americans/Blacks experience higher rates of DMT2 and its related complications than any other ethnic group due to many barriers to proper diabetes management according to Byers, Garth, Manley, and Chlebowy, (2016). Some of these barriers include lack of information, lack of support, lack of motivation, and lack of education from care providers. African-American/Black populations also have a higher rate of diabetes complications including diabetic retinopathy, lower extremity amputations, and kidney failure as compared to the Caucasian population, but proper education on self-care can help diabetes patients to effectively manage these disease (Gumbs, 2012).

Improving diabetes diet education should lead to a reduction in the development of complications. The ADA (2008) reports that, for every 1% drop in HbA1c, there is a 40% decline in the risk of developing diabetes complications. This equates to a 90% decrease in cases of blindness related to retinopathy, a 50% decrease in renal disease, a 90% decrease in vascular disease leading to amputations, and a 40% decrease in deaths related to cardiovascular disease.

Summary

DMT2 leads to high blood sugar in the body and if not corrected over a period of time, it leads to the development of complications. These complications include blindness, kidney failure, and retinopathy, among others. DMT2 continues to affect many people in the USA, especially African-Americans/Blacks who have the highest prevalence as compared to other races (Alvarez et al., 2010).

The number one environmental cause of diabetes is obesity. Proper diet management can lead to weight loss and controlled blood sugar. Approximately 60-70% of North Americans are obese, but that number approaches 100% in patients with DMT2 (Papadakis et al., 2017). Obesity results in insulin resistance which can lead to the development of DMT2. Proper meal management will lead to better weight and better blood sugar control.

CHAPTER 2

LITERATURE REVIEW

Overview of Diabetes

Diabetes affects more than 29 million Americans and more than 86 million Americans are living with pre-diabetes, according to the Centers for Disease Control and Prevention (CDC) (2016a). DMT2 accounts for 90-95% of all those diagnosed with diabetes, while Type 1 Diabetes Mellitus (DMT1) accounts for only 5-10% (McCance, Huether, & Brashers, & Rote, 2013. Diabetes is the leading cause of kidney failure, lower-limb amputations, and blindness. More than 20% of healthcare spending is for people diagnosed with diabetes, according to the CDC (2016b). Risk factors include being overweight, having a family history of diabetes, being physically inactive, having gestational diabetes, and having a baby heavier than nine pounds.

It has been recorded that, in 2011, almost 175,000 emergency room visits for all people of all ages had hyperglycemic crisis as a diagnosis. In the same year, 282,000 of emergency visits by adults age18 years and older had hypoglycemic crisis as the first diagnosis. In 2010, the hyperglycemic crisis caused 2,361 deaths. Between 2009-2012, 71% of those diagnosed with DM had a blood pressure greater than 140/90 mmHg and were using medications to lower the pressure. In the same years, 65% of those with LDL greater than 100mg/dl had diabetes according to the National Diabetes Statistics Report of the National Center for Chronic Disease Prevention and Heath Promotion (2014).

Between 2003-2006, cardiovascular disease death rates were about 1.7 times higher among those who had DM as compared to those who did not have DM. In 2010, the hospitalization rate for heart attack was 1.8 times higher among adults who did have DM than among those who did not have DM. In the same year, hospitalization rates for strokes were 1.5 times higher among adults diagnosed with DM and who were at least 20 years old as compared to those without DM. Between 2005-2008, 4.2 million (28.5%) people had damaged small blood vessels in the retina due to high blood sugar levels; a condition that may result in loss of vision. In 2010, about 60% of non-traumatic lower-limb amputations among patients who were at least 20 years occurred due to diabetes, and in the same year, diabetes was recorded as the cause of death on a total of 234,051 death certificates (National Diabetes Statistics Report of the National Center for Chronic Disease Prevention and Heath Promotion 2014).

The prevalence of multi-morbidity was 90.4% (Alonso-Morán, Satylganova, Orueta, & Nuño-Solinis, 2014) among patients who had DM and that was the primary cause of kidney failure in 44% of all new cases of the people who developed kidney failure in 2011. The total estimated cost for DM in America in 2012 was $245 billion. Such a burden calls for education intervention for proper diet management since it might reduce some of the negative impact in diabetes patients.

The ADA (2017b) documented that 33-49% of DMT2 patients do not meet targets for glycemic, blood pressure, or cholesterol control and this challenges healthcare professionals to emphasize better diet management in order to better manage diabetes and reduce complications. Patient-centered care is highly encouraged when counseling patients, especially when one is dealing with chronic illnesses. The patient-centered

model considers patients' values and opinions when guiding them on how to care for themselves (ADA, 2017b).

Diabetes Diagnosis

How is DM Diagnosed

DMT2 is diagnosed based on plasma glucose or HbA1c (ADA, 2017b). Fasting plasma glucose (FPG) or the 2-hour plasma glucose (2-h PG) values after a 75-g oral glucose tolerance test (OGTT) are the first non-invasive means of detecting diabetes or prediabetes in a patient. The FPG and 2-h PG may be used to diagnose diabetes and compared to FPG and HbA1c values. Testing HbA1c levels requires a blood draw. According to ADA (2017b), the 2-hr PG value is used more frequently to diagnose people with diabetes. The fasting glucose cut off point is > 126 mg/dl, 7.0 mmol/L (ADA, 2017b). HbA1c is a convenient, indirect measure of average blood glucose levels and does not require fasting. It provides greater pre-analytical stability and less day-to-day perturbations during stress and illness. It, however, costs more than other diagnostic methods and may not be readily available to some patients. HbA1c cut-point is > 6.5% (48 mmol/mol) (ADA, 2017b).

Factors to consider when using HbA1c to make a diagnosis are age, race, anemia/ hemoglobin-pathises. HbA1c should only be used in adult populations. Its utility in diagnosing children is still unclear (ADA, 2017b). African-Americans/Blacks may have higher HbA1c levels than non-Hispanics whites despite fasting or post-glucose load, glucose level. There is evidence that African-Americans/Blacks have higher levels of fructosamine and glycated albumin and lower of 1.5-anhydroglucitol. This means that their higher glycemic burden predisposes them to higher HbA1c and increased

complications as compared to non-Hispanic whites (ADA, 2017b). For patients with abnormal hemoglobin but with normal red blood cell turnover, those with conditions like sickle cell trait, an HbA1c assay without interference from abnormal hemoglobin should be used. Only blood glucose criteria should be used in diagnosis of DM for patients who have a high red blood cell turnover—for example pregnant women or hemodialysis patients—or those who have lost blood recently, or have been transfused, or had erythropoietin therapy.

Confirming DMT2

Glucose threshold and symptoms of hyperglycemia are important factors in confirming DMT2. Hyperglycemia, a classic symptom of diabetes, and a random blood sugar above 200mg/dl, confirm DMT2. If there is no classic symptom, then a second test is recommended to confirm diagnosis. The same test, e.g. the HbA1c, can be repeated with a different sample of blood. Alternatively, two different tests, like HbA1c and FPG, can be done to confirm diagnosis of diabetes. Two reads above the threshold—two HbA1C readings above 6.5% or HbA1c and FPG above diagnosis threshold—will confirm diagnosis of diabetes. If an individual is without symptoms, a second confirmatory test is recommended (ADA, 2017b). Patients who are near margins of diagnostic threshold should have their test repeated after 3-6 months.

The normal level of fasting plasma glucose is <100mg/dl, normal oral glucose tolerance levels is <140mg/dl (75-g glucose, 2-hr plasma glucose), and normal results of HbA1c is <5.7% (Buttaro et al., 2017). A C-peptide level can be helpful in distinguishing between DMT1 and DMT2. Markers of DMT1 include islet cell autoantibodies, insulin autoantibodies and GAD65 autoantibodies.

Clinical Manifestation of DMT2

The individual with DMT2 can go for weeks, months, or years without any detection. However, vascular and neurological complications can start and advance before diagnosis (Buttaro et al., 2017). Some conditions that might indicate underlying diabetes include cranial nerve palsies, acanthosis nigricans, vitiligo, Dupuytren's contracture, autonomic neuropathy, and increased incidence of candida vaginitis, skin infections, and a number of urinary tract infections and atrophic changes.

Common manifestations include being overweight, dyslipidemia, hyperinsulinemias, and hypertension. The individual might show classic signs of DM, including polyuria, polydipsia, and, sometimes, nonspecific symptoms such as fatigue, pruritus, recurrent infections, and visual changes (McCance et al., 2013).

Pathophysiology of DMT2

DMT2 is caused by insulin resistance due to altered cellular metabolism and an intracellular post receptor defect (McCance et al., 2013). In general, patients get DMT2 due to insulin resistance with inadequate insulin secretion. An environmental-genetic interaction appears to be responsible for DMT2. The most recognized risk factors are age, obesity, hypertension, physical inactivity and family history. Metabolic syndrome—comprised of central obesity, dyslipidemia, and pre-hypertension, and fasting blood glucose more than 100mg/dl— also predisposes individuals to develop DMT2. Insulin resistance in women of reproductive age results in a condition that is known as polycystic ovary syndrome, which puts women at risk of diabetes at seven times the average risk for women without polycystic ovary syndrome (McCance et al., 2013).

Some genes have been identified as being associated with DMT2—for example, those that code for beta cell mass, beta cell function, proinsulin and insulin molecular structure, insulin receptors, hepatic synthesis of glucose, glucagon synthesis, and cellular responsiveness to insulin stimulation. When these genes combine with environmental factors like obesity, insulin resistance, and decreased insulin secretion by beta cells, the person eventually develops DMT2. It is also important to note that, although many people have risk factors including obesity, metabolic syndrome and hypertension, not all of them will develop DMT2. Only those predisposed to beta cell dysfunction will develop DMT2 (McCance et al., 2013).

Hyperglycemia results from increased hepatic glucose production and impaired insulin secretion in the impaired first phase of insulin secretion (Buttaro et al., 2017). Fasting hyperglycemia is caused by the decreased uptake of glucose in the skeletal muscles. In response to the elevated blood glucose levels, the insulin pathways become resistant to hormonal impulses, resulting in hyperinsulinemia. If hyperglycemia progresses, diabetes occurs. Glucose intolerance advances due to hyperglycemia, which results from insufficient insulin production by beta cells. Hyperglycemia leads to micro vascular and macro vascular damage to target organs such as eyes, kidney, heart, blood vessels, and nerves.

Insulin resistance. According to McCance et al., (2013), this occurs when the insulin-sensitive tissues like liver, muscles, and adipose tissue become less responsive to insulin. This might happen due to an abnormality of the insulin molecule, high amounts of insulin antagonists, down-regulation of post receptor kinases and defects in glucose

transporter proteins. Obesity leads to insulin resistance through the following ways as state by McCance et al., (2013):

1. Elevated, serum-free fatty acids and intracellular deposits of triglycerides and cholesterol interfere with intracellular insulin signaling, decreasing responses to insulin. Elevations in fatty acids can also alter insulin secretion within beta cell.
2. Inflammatory cytokines are released from intra-abdominal and adipocyte-associated mononuclear cells and they induce insulin resistance through a post-receptor mechanism.
3. When one is obese, there are changes that happen and adipose tissue produces some hormones like Adipokines, which eventually lead to decreased insulin sensitivity.
4. Obesity is correlated with hyperinsulinemia and decreased insulin receptor density.

Beta cell dysfunction. Beta cell dysfunction can be caused by a decrease in beta cell mass, abnormal function of the beta cells, or any other factor. It leads to a deficiency of insulin activity. There is a decrease in weight and number of beta cells in patients with DMT2. Beta cells are usually very sensitive to high levels of glucose and free fatty acids, and so when a person is obese, it leads to elevated levels of free fatty acids and glucose, which leads to the death of beta cells. When one is obese, there is an increased production of adipokine leptin, which decreases insulin synthesis in the beta cell. Inflammation can also cause beta cells to malfunction, resulting in deficiency of insulin in the body. In general, obesity-related causes of insulin resistance include elevated free fatty acids,

hyperglycemia, adipokines, and inflammatory cytokines, which promote beta cell death (McCance et al., 2013).

High glucose levels. High glucose levels in the body inhibit glucagon release and the body can stop producing more glucose than in a normal human being. In individuals with DMT2, the high levels of glucagon have long been known to play a role in the production of glucose and resultant hyperglycemia. Glucagon is a hormone produced by the alpha cells of the pancreas and acts primarily in the liver to increase blood glucose. Glucagon acts as an antagonist to insulin (McCance et al., 2013).

Amylin. *Amylin* is a hormone co-secreted with insulin by beta cells and its deficiency in DMT2 leads to reduced insulin secretion (McCance et al., 2013). Incretins like Ghrelin, Glucagon-like peptide one, and glucose-dependent insulinotropic polypeptide, are peptides that are released from the gastrointestinal tract in response to food intake, and they increase insulin responsiveness to meals. Glucagon-like peptide one is cleaved from intestinal mucosa. Glucose-dependent insulinotropic polypeptide is synthesized in the duodenum and jejunum. The incretins bind to receptors on beta cells and increase the synthesis and secretion of insulin in the response to glucose levels. The incretins are then inactivated by the enzyme dipeptidyl peptidase 1V. Ghrelin is a peptide produced in the stomach in pancreatic islets that stimulates Growth Hormone receptors. Decreases in ghrelin have been associated with insulin resistance and increased fasting insulin levels.

Examination and Evaluation of Patients with DMT2

The goal of examining the patient with DMT2 is to evaluate blood glucose, assess for end-organ damage, and assess for autoimmune disorders like thyroid or any other

causes. It should be emphasized that poor blood sugar control leads to end-organ complications, and that is why a proper diet is emphasized to achieve better glycemic control (Buttaro et al., 2017). The caregiver should schedule visits every three months to assess the presence or progress of end-organ damage.

Each visit of the patient with DMT2 should include assessment of weight, height, BMI, and blood pressure; and a review of glycemic control through review of glucose logs. Funduscopic examination of the eye for hemorrhages or exudates should be done. Gums should be assessed for fungal infection or lesions. The thyroid should be palpated for enlargement or nodules. The heart should be auscultated for rhythm, murmurs, clicks, or extra heart sounds. Skin should be inspected for any irritation, infection, redness, ulcers or acanthosis nigricans. The feet should be palpated for the presence of pulses and checked for the presence of patellar and Achilles reflexes. Monofilament examination should be done to assess protective sensation (Buttaro et al., 2017).

Treatment of DMT2

Diet and exercise are first line of management in patients with DM. American Diabetes association (2017d) suggests that individuals with morbid obesity, who are unresponsive to diet or exercise, may need bariatric surgery (Gastric Bypass or Laparoscopic Gastric Banding) as a last resort in management of DMT2. This kind of surgery is usually considered for adult patients with DMT2 with BMI above 35(ADA, 2017d).

Dietary Measures

Restriction of the total caloric intake is very important in prevention and treatment of DMT2. Limiting carbohydrate intake and replacing other foods with nuts and avocados can lower triglycerides and increase high-density lipoprotein (HDL) cholesterol (Papadakis, et al. 2017). Obese individuals should remember that as they lose the weight their resistance to insulin would often diminish, improving glucose tolerance (McCance et al., 2013). Both non-obese and obese patients with DMT2 should focus on achieving glucose, lipid, and blood pressure goals. Dietary interventions must be individualized, and structured programs are most helpful. There should be reduced intake of fats and carbohydrate. Carbohydrate monitoring can be achieved through carbohydrate counting, food exchanges, or using foods based on the Glycemic Index (GI). Saturated fat intake should be less than 7% of total calories. Foods that contain whole grains and dietary fiber intake of 14g/100 kcal should be consumed. Diet management should be combined with exercise to achieve a moderate weight loss and lower HbA1c to less than 7% (McCance et al., 2013).

Exercise

Patients with DMT2 should exercise 150 minutes per week (McCance et al., 2013). Exercise reduces postprandial (after a meal) blood glucose level, diminishes insulin requirements, lowers triglycerides and cholesterol levels, and increases the level of HDL cholesterol. Exercise also helps overweight individuals to lose weight. Individuals taking DM medications should be careful about hypoglycemia while exercising.

Medications

Medications are necessary for optimal management of DMT2 when diet and exercise have failed. Before putting patients on oral hypoglycemic agents, the care provider should check if their pancreas secretes insulin (McCance et al., 2013). Sulfonylurea, biguanide, thiazolidinedione, DPP-IV inhibitors, and alpha-glucosidase inhibitors are all useful in treating patients with DMT2. Sulfonylureas augment beta cell insulin secretion. Biguanides such as metformin inhibit hepatic glucose production and increase the sensitivity of peripheral tissue to insulin. The thiazolidinedione class activates a nuclear receptor known as peroxisome proliferator-activated receptor, which in turn regulates cellular carbohydrate and lipid metabolism. The DPP-1V inhibitors increase GLP-1 levels that in turn help augment endogenous insulin secretion. Alpha-glycosidase inhibitors decrease postprandial hyperglycemia through delaying carbohydrate digestion and absorption. Insulin therapy might be needed in the later stages of DMT2 due to loss of beta cell function. Because of the combination of insulin resistance and insulin deficiency, it is common to combine therapeutic agents from different classes of oral agents in order to achieve acceptable glycemic control (McCance et al., 2013).

Surgery

Surgery comes as a last result in the treatment of DM. ADA (2017d) suggests that individuals with morbid obesity, who are unresponsive to diet or exercise, may need bariatric surgery as the only alternative to manage DM(Gastric Bypass or Laparoscopic Gastric Banding). This kind of surgery is usually considered for adult patients with DMT2 with BMI above 35 (ADA, 2017d). Gastric bypass surgery is associated with a

decrease in the incidence of DMT2 and marked improvements in glycemic control in those with established diabetes (McCance et al., 2013).

Prevention of DMT2

Early Screening

Screening should be done so that those who are predisposed can be identified early. According to the ADA (2017b), age is a major risk factor, and testing for diabetes should begin at 45 years of age for all patients. Screening should also be considered in those who are obese or overweight—a BMI of > 25kg/m^2. African-Americans/Blacks with a lower BMI of even 26kg/m^2 have a higher chance of developing diabetes, compared to non-Hispanic whites, who need a BMI of 30 kg/m^2 to develop diabetes. Hence, African-Americans/Blacks need guidelines to control BMI, before it is too late (ADA, 2017b). Screening should be done for children and all community members at various locations like dental and primary care clinics so that we can stop this epidemic of diabetes before it gets out of control.

Having a Normal BMI

It is recommended that for individuals to minimize the risk of developing DMT2, they should have a normal BMI of 18.5-24.9 kg/m^2 (ADA 2017b). Those with a BMI of above 25.0 kg/m^2 are considered at risk of developing DMT2 since obesity and overweight have strongly been linked with development of DMT2 (ADA 2017b).

How HbA1c Impacts Diabetes Outcome

HbA1c is a convenient, indirect measure of average blood glucose levels. It is an indicator of adequate self-behaviors, and researchers have found consistently high levels

of HbA1c among patients with DM who have complications (Gumbs, 2012). The target level of < 7.0 % is required for people who have DM (Goroll & Mulley, 2014). It provides greater pre-analytical stability than finger checks of blood sugar. Further lowering of HbA1c from 7 to 6% (53 mmol/mol to 42 mmol/mol) will lead to an even smaller risk of developing complications from DMT2 (ADA, 2017b).

A drop in HbA1C results to decreased risk of developing diabetes complications. One way to prevent complications from diabetes is through having a proper diet, which could lower HbA1c levels. Goroll and Mulley (2014) give evidence of the fact that carbohydrate control should be a major treatment objective for all people with diabetes.

HbA1c is only to be used in adult populations to measure their average sugar over an average of three months (ADA, 2017a). African-Americans/Blacks may have higher HbA1c levels than non-Hispanic whites despite fasting or post-glucose load glucose level. This means that their higher glycemic burden predisposes them to higher HbA1c, and increased complications as compared to non-Hispanic whites (ADA, 2017a). Individual assessments should be done on African-Americans/Blacks so that DM education can be tailored to each patient. According to Gumbs (2012) education will lead to proper diet management, glucose monitoring, and less stress which in turn could result in lowered HbA1c levels.

Complications of DMT2

DMT2 causes pathologic changes in both small and large blood vessels, cranial and peripheral nerves, the skin, and the lens of the eye among other body systems. These changes can lead to hypertension, end-stage chronic kidney disease, blindness, autonomic

and peripheral neuropathy, amputation of lower extremities, myocardial infarction, and cerebrovascular accidents (Papadakis et al., 2017).

Patients with DMT2 are most likely to have macro vascular disease leading to myocardial infarction and stroke as the main cause of death. Patients with diabetes who smoke, have hypertension, or dyslipidemia, or a family history of cardiovascular condition, should be given 81-325 mg of aspirin daily. Chronic hyperglycemia can lead to premature cataracts. Glaucoma will develop in 6% of the people who have diabetes. More than 4,000 people with diabetes develop end-stage chronic kidney disease each year in the USA. An antihypertensive therapy protein diet of 0.8g/kg/day with good glycemic control can all prevent nephropathy. HbA1c, which reflects average glycaemia over an average of three months, has a predictive value for diabetes complications. A study by the ADA (2017a) revealed that African-Americans/Blacks have a higher reading than non-Hispanics.

Damaged nerve endings lead to loss of pain sensation and inflammatory responses. Therefore, there is a higher risk of infection. There is also ischemia of lower extremities, erectile dysfunction and intestinal angina. Patients who have had diabetes for a long time are at risk for stiffness of hands, frozen shoulders, carpal tunnel and other fractures. All these complications are brought about by hyperuricemia, obesity, hypertension, and dyslipidemia. Diabetics with these complications should stop smoking, manage cholesterol and dyslipidemia, control blood pressure, and prevent foot injury.

Diet and Diabetes

Diet is very important especially when it comes to DMT2 management. Education should be done on a regular basis while taking into considerations the individual's personal and cultural differences, socioeconomic status, and readiness (Hendrychova, Vytrisalova, Vlcek, Smahelova, & Kubena, 2013). Despite efforts being made by primary care providers, adherence to proper diet is poor, hence a negative impact on diabetes management. A study that included 3,234 overweight, diabetic men and women age 25-85 proved that education on the *Low-fat diabetes diet* and other lifestyle changes can improve diabetes outcomes (Papadakis et al., 2017). The interventions utilized in the project included a low-fat diet and 150 minutes per week of moderate exercise like brisk walking. The control group took 850 mg of metformin twice a day to reduce their risk of DMT2 progression. The results of the study indicated that the group on the *Low-fat diabetes diet* and moderate exercise had a 71% reduction in the risk of progress of DMT2 as compared to the control group that had only 31% reduction (Papadakis et al., 2017).

Diabetes Meal Planning Methods

There are three major ways of planning a diet for diabetics, according to Mayo Clinic (2017).

a) The plate method. The plate method uses seven steps or guidelines in meal planning as suggested by the ADA (2017c). First, fill one-half of a plate with non-starchy vegetables, such as spinach, carrots, and tomatoes. Next, fill one-quarter with a protein such as tuna, lean meat, or legumes for best results. Then fill the last quarter with a whole-grain item for better glycemic control. The ADA (2017c) also recommends adding a serving of fruit or non-fat dairy

and a drink of water or unsweetened tea or coffee. This plate method was used in this project.

b) The carbohydrates count method. Because carbohydrates break down into glucose, they have the greatest impact on blood sugar levels. Special attention is paid to serving size and carbohydrate content of food. A dietitian may be needed to teach patients how to measure food portions and read food labels. Insulin is usually adjusted according to the amount of carbohydrate in each meal or snack.

c) The exchange list system. In this method a dietitian recommends using a food exchange list to help plan meals and snacks.

I chose the plate method because there was no registered dietician at the clinic within the time allocated for the project. One would be needed for the other methods of meal preparation (carbohydrates count and exchange list system). The plate method is a simple method that can be implemented by most patients without the help of a dietician but with the guide of primary care providers.

Guidelines for Patients with DMT2

The nutritional goal is to improve the participants' glycemic control. Buttaro et al. (2017) make the following dietary recommendations for patients:

a) Calories: Adequate for weight control, growth and development.

b) Proteins: 15% to 20% of calories. High protein calories are not recommended.

c) Fat: Less than 7% of total calories from saturated fat and minimal intake of Trans fat.

d) Carbohydrates: Remainder of calories from a variety of sources like fruits, vegetables,

   Whole grains, legumes, and low-fat milk.

e) Cholesterol: <200gm/day.

f) Fiber: 20-35 g/day.

g) Sodium: Average of 2000mg or below.

h) Alcohol: Limited to one alcoholic beverage of 12 oz. beer, or 5oz wine, or 1½ oz. distilled spirits per day for women and two for men.

Evidence-based Diabetes Diets

Mediterranean-style diet. Mediterranean-style eating patterns give good results among diabetics. It improves glycemic control and lowers cardiovascular complications, including strokes (Papadakis et al., 2017). When comparing the outcomes of those on a plant-based diet rich in beans, nuts, legumes, fruits, and vegetables with those on an animal-rich diet consisting of eggs, meat, fish, chicken, milk, and few vegetables, the participants on the plant-based diet received better outcomes while the participants on the animal-based diet received poor outcomes (Satija et al., 2016). The recommendations were for the patients to choose a plant-based diet rich in legumes, fruits, and vegetables, instead of refined grains and refined fruit juices.

For patients with diabetes and kidney disease, proteins should be maintained at 0.8g/kg/day. Soluble fibers such as gums and pectin, which are found in beans, oatmeal, and apple skin, tend to slow nutrient absorption rate so glucose absorption is slower, and hyperglycemia is diminished. Foods with high soluble fiber—such as beans, oatmeal, and cereals—should be the main component in the diet of persons with DMT2. Eating foods

with low scores on the GI results in lower glucose levels after eating, and the diabetic patient might need less insulin than normal. This can lead to lower healthcare costs and fewer complications (Papadakis et al., 2017).

Mayo Clinic (2015) recommends a vegetarian diet over the non-vegetarian diet. The benefits that were proposed include better weight control, reduced risk of some diabetes-associated complications, and making the body more responsive to insulin. These benefits result because a vegetarian diet often has fewer calories than non-vegetarian diets, hence improving blood sugar control. Vegetables, fruits, whole grains, legumes, and nuts improve blood sugar control and make the body more responsive to insulin, leading to less medication usage and lowered complications. A strict vegetarian diet is cholesterol-free and low in saturated fat, yet high in fiber. This reduces the risk for cardiovascular disease, a common complication among African-Americans/Blacks who have diabetes.

Low-glycemic index diet. The ADA (2014) defines the GI as a measure of how carbohydrates raise blood glucose. Foods with low GI (55 or less) are highly recommended for people with diabetes and include 100% stone-ground whole wheat or pumpernickel bread, oatmeal, oat bran, pasta, converted rice, barley, bugler, sweet potato, corn, yam, lima/butter beans, peas, legumes and lentils, most fruits, non-starchy vegetables and carrots.

Foods with a medium GI (56-69) are not as highly recommended for people with diabetes. They include foods such as whole wheat, rye, quick oats, and brown, wild or basmati rice

Foods with a high GI (70 or more) are not highly recommended for people with diabetes and those include: white bread or bagel, corn flakes, puffed rice, bran flakes, instant oatmeal, short grain white rice, rice pasta, macaroni and cheese from a mix, russet potato, pumpkin, pretzels, rice cakes, popcorn, saltine crackers, melons, and pineapple.

Patients should be taught that glycemic control could reduce diabetes complications, which could be achieved through consumption of foods with a GI value of 55 or less (ADA, 2017c). Such foods may include a variety of fruits, vegetables, grains, and legumes, among others. White rice, white bread, and baked potatoes have a GI score of 70 or above and should be avoided. Chidolue, Merritt, and Chaney (2013), give an example of a 44-year-old female whose doctor diagnosed her with DM. The patient was given dietary recommendations, to include controlled food portions. The patient was advised to visually divide her plate in two. Half of the plate should consist of a majority of non-starchy vegetables that are low on the GI. The other half should be filled with a small serving of proteins, and a small serving of carbohydrates with a GI score of 55 or less. This was to be done along with exercise, to achieve the goal of having a blood pressure of 130/80mm Hg, LDL below 100mg/dL, triglyceride levels below 150mg/dL, and an HDL above 40mg/d. After the study was completed, these goals were achieved, and the patient never received any insulin.

Chidolue et al. (2013) suggest that patients should choose from a variety of foods and half of their plate should have vegetables with a low GI rating such as beets, broccoli, cabbage, carrots, cauliflower, cucumber, green beans, lettuce, greens, mushrooms, okra, onions, peppers, salsa, spinach, tomatoes, turnips, vegetable juice. The other half should consist of meats or plant proteins and carbohydrates with GI less than 55. The protein

portion can contain foods such as low-fat cheese, eggs, catfish, codfish, salmon, tuna, lean beef, pork, lean chicken, lean turkey, tofu, peas, black eye beans, navy beans, and pinto beans. Carbohydrates with a low GI rating include whole-wheat breads, potatoes, winter squash, corn, and lima bean.

Low-fat diet. Hendrychova, et al. (2013) noted that, despite efforts being made to educate diabetes patients on proper diet, adherence is poor. More than anything else, fat in the diet negatively affects the outcome of diabetes in a patient. Patients with diabetes should reduce their fat intake by substituting high-fat foods with processed low-fat foods, avoiding frying foods, replacing high starch foods with non-starch fruits and vegetables, using fat-free milk, trimming all the fat from meats, avoiding fat as a spread or flavoring, using fruits and vegetables for desserts and snacks among other strategies. Patients with diabetes should try to eat noodles or eat pasta without meat for that can help to. Five factors should be considered when preparing food for patients with diabetes, in order to make it a *Low-fat diabetes diet*, according to Hendrychova, et al. (2013):

Factor 1—Substituting processed food that had high with one that has low-fat foods (like taking skim milk instead of whole milk). Eating extra-lean ground meat is also advisable for those who would like a low-fat diet.

Factor 2—Modify meat. Trimming the fat from any meat before cooking or removing skin from chicken it is the best way to minimize fat.

Factor 3—Avoid frying food (try baking, boiling or broiling instead)

Factor 4—Replace high-fat foods with low-fat foods such as fruits and vegetables. Instead of having cup cake for snack, raw vegetables like carrot sticks can be used and instead of using apple pie for desserts, apples fruits or any other fruits can be used.

Factor 5—Avoid fat as a spread or flavoring. Patients with diabetes should try to eat bread, rolls, potatoes or crackers without butter or margarine or sour cream. Salad dressing can be avoiding and instead lemon or vinegar can be used to flavor salads.

Patients tend to more willing to modify their diet than remove it completely form their menu. Most patients will be willing to modify remove the skin from chicken and bake the chicken, then when they are told by the providers to remove the chicken from their diet completely or to replace it with other foods. This supports the assumption made by Hendrychova, et al. (2013) that reducing dietary fat intake, using less fat in the food preparation, or using low-fat alternatives to traditional high-fat ingredients may work better when working patients with DMT2.

Eating salads without dressing, eating one or more vegetables at lunch, eating fresh fruit at breakfast, eating salads with low-fat or nonfat dressing, not eating meat, fish, eggs, or cheese at dinner and instead eating two or more vegetables at dinner are also some of the ways we can ensure that the patients with DMT2 are eating a low-fat diet. Using olive oil when cooking, using low-fat or nonfat mayonnaise, using less fat when baking cookies or cakes are also other ways to cut down on fat according to Hendrychova, et al. (2013)

African-American/Black Challenges to Proper Diabetes Diet Management

Studies conducted by Byers et al. (2016) revealed that African-Americans/Blacks with DMT2 struggle to manage the disease as they find it difficult to adhere to nutritional guidelines and medications. Gavin III, Fox, and Grandy (2011) noted that racial and ethnic differences exist in the final outcomes of chronic diseases, especially for patients

with DMT2. African-Americans/Blacks are mostly affected by micro vascular complications such as retinopathy, neuropathy, and nephropathy more than any other ethnic group in America. These disparities are affected by a lack of healthcare access and utilization for chronic disease management and these disparities, including institutional racism, discrimination, socioeconomic status, poor access to healthcare, education, and lack of health insurance according to ADA (2017c). In addition to these disparities, obesity, unhealthy eating habits, physical inactivity, and smoking make it imperative for African-Americans/Blacks to change their lifestyles. Barriers to better outcomes like forgetting to take medication, fear, depression, and health beliefs hinder adherence. Medication barriers include complexity, multiple daily dosing, costs, and side effects. System barriers include inadequate follow-up or support.

Studies continue to show the challenges that individuals face while trying to eat healthily. The results of a study of 37 African-American/Black and Latino patients who live an urban area showed that the participants were overwhelmed by inexpensive, unhealthy, poor-quality foods and that better-quality foods were out of financial reach. Some participants commented that there was scant information from clinicians regarding how they can individually change to better lifestyles. Others said that there were not enough guidelines for diabetics to use and if there were any, the language was too complex for them to understand. Finally, the participants mentioned stress related to racism, discrimination, and poverty, as challenges to their attempt to eat healthfully, which in turn led to negative outcomes of diabetes (ADA, 2013). The study concluded that African-American/Black and Latino population groups have a higher prevalence of

diabetes and its complications due to factors like food insufficiency, under education, and inaccessibility to healthy foods.

The complexity of DMT2 management can burden minority groups such as African-Americans/Blacks that have a high rate of poverty and minimal healthcare. Yet, little is being done to help this group. Simple measures such as good diet planning can help, if well-informed practitioners would take the initiative during their practice to make a difference. Providing patient-centered guidance that is nonjudgmental can help in identifying these barriers so that we can motivate patients to adopt better lifestyles. Making simple suggestions in treatment, like simple meal plans, can increase adherence among patients (ADA, 2017a).

In a study by Jones et al. (2006), 68 adult African-American/Black participants effectively used diet as a complementary and alternative therapy for diabetes management. Items such as ginger, tea, and cinnamon were used as coping strategies to help mitigate the stress that comes with diabetes, such as from finger pricking or dealing with the cost of supplies. The care providers should consider the treatment burden and self-efficacy when recommending treatments, which should be individualized depending on barriers to achieving the best treatment goals (ADA, 2017a). Gumbs (2012) noted an increase in self-care behaviors among African-American/Black women after they received education on diabetes. Care providers should promote comprehensive education to have better patient outcomes.

How to Promote Change in Diet

A change in lifestyle is imperative for the patient who has diabetes (Davies, 2011). Much money has been invested to ensure changes occur. The government spends billions of dollars on paid advertisement to ensure that there is diffusion of innovations through mass media (2004). Currently, more time, money, and talents are invested than ever before to promote social change. Over the past 40 years, there has been a reduction in tobacco use and infant mortality and an increase in family planning in developing countries. This huge success has been credited to the successful integration of new ideas and behaviors into a person's lifestyle, according to Smith (2004). Despite these successes, areas like obesity and diabetes control in first world nations remain a struggle.

In a study that was done to find out if DMT2 patients can change their lifestyle, it was discovered that knowledge is essential for making lifestyle changes following patient education. Obtaining new knowledge, taking responsibility for one's health, receiving confirmation of an already healthy behavior most likely will make a diabetic patient adhere to a new lifestyle (Rise et al., 2013). Support from others and fear of developing complications lead patients to make changes in their diets.

As practitioners, our goal will always be for our patients to embrace learned knowledge and put it into practice. Smith (2004) explains the five stages, first proposed by Rogers (1995) that are involved in helping people integrate new information into their life. The first stage is the knowledge stage, when a patient learns about some information and how it is used. It is during this first stage that the study participants in the experimental group asked questions in order to reduce uncertainties about the concept of a *Low-fat diabetes diet*. The patients in the experimental group were then educated about

a *Low-fat diabetes diet*. The second stage is the Persuasion stage where the individual develops favorable or unfavorable attitude towards innovation. Most participants in the experimental group liked the idea of a *Low-fat diabetes diet* and were willing to make simple adjustments to their meals. The third stage is the Decision stage when an individual does activities that lead to a choice to adopt the innovation. It is in the third stage that patients were given a list of good choices from which to choose, such as whole grains foods, foods with lower a GI, and non-fried foods. They were also taught how to prepare food by removing the fat from meat and baking instead of frying foods, among other practices that will lead to the *Low-fat diabetes diet*. Stage four is the Implementation stage when an individual utilizes an innovation. This stage is about change of behaviors and practicing new behaviors. The patients started substituting high-fat foods with low-fat foods, for example using 1% milk instead of whole milk. Stage five involves Confirmation, when an individual seeks reinforcement of an innovation decision. Education intervention will continually be reinforced at the clinic by the staff during every primary care visit so that change can occur.

Our role as practitioners is to emphasize the importance of the *Low-fat diabetes diet*, which leads to lower HbA1c and BMI, and which is associated with reduced diabetes-related complications (ADA, 2017b). Mitchell (2013) explains that change can be implanted even though it is a challenging exercise. Factors like rising cost of treatment, workforce shortages, complexity of diseases and its complication force an institution to move towards change. This calls for the right change theory to be implemented so that there is proper communication, appropriate leadership, and

appropriate framework for not only implementing change, but also managing and evaluating the change.

Theoretical Conceptual Framework

Lewin's Change Theory

Lewin's Change Theory was used to motivate the patients to change to a better diet. Kurt Lewin is a pioneer of change who identified three stages of change before it becomes part of us (Mitchell, 2013). The first stage is Unfreezing (when change is needed). It is at this stage that the patient's diet was assessed for any concerns related to a *Low-fat diabetes diet*, and if they are motivated for change. The second stage is moving (when change is initiated) and it is at this stage, the DMT2 patients were given information on the *Low-fat diabetes* diet and what they should include or remove from their diet. They were educated to avoid fried food, trim fat off meat, choose low-fat foods, eat whole foods rather than processed foods, and eat a lot of non-starch vegetables more than any foods. The last stage is Refreezing (when equilibrium is established). It is during this stage that assessment was done to find out if the new changes have been successfully integrated into individual eating habits. Patients were encouraged not to return to previous unhealthy eating habits, but to follow suggested, healthy eating habits (Figure 1).

Lewin's Change Theory		**Nursing Process**
Unfreezing	→	Assessment
Moving	→	Planning and implementation
Refreezing	→	Implementation and Evaluation

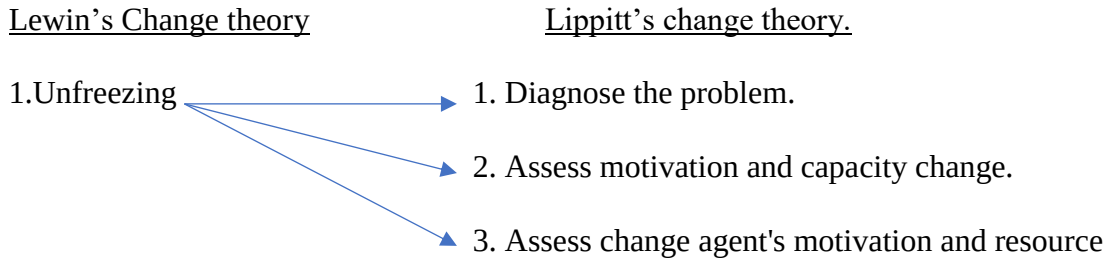
Figure 1. Comparison of Lewin's change theory and Nursing process.

Lippitt's Change Theory

Lippitt's change theory is an extension of Lewin's three-step theory and it uses the language of nursing process. Lippitt's change theory has seven phases, according to Manyibe, Aref, Hunter, Moore, and Washington (2015) (Figure 2). Phase one is diagnosing the problem, phase two is assessing motivation and capacity of change, phase three is assessing the resources and motivation of the change agent, which is the institution. Phase four is defining progressive stages of change, phase five is ensuring the roles and responsibilities of the change agent are clear and well understood. These first five stages are all involved in the planning stages for change. Phase six is implementing the change and communicating feedback. In phase seven, the change agent gradually terminates and withdraws from the helping relationship. There should be someone to maintain and sustain change and, in this project, the primary care providers in the clinic will be responsible for sustaining the change by ensuring that patients get the right diabetes diet education through the use of the product materials from this project.

Comparison of the two theories.

The two theories can be compared easily using the following diagram



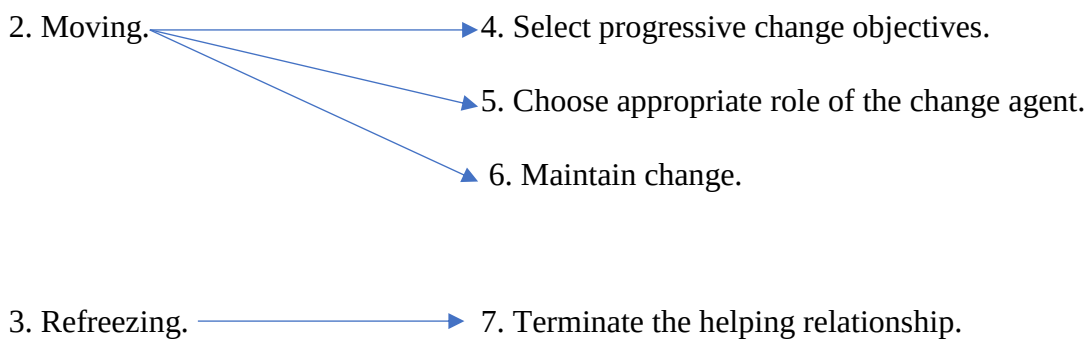


Figure 2. Comparison of Lewin's change theory and Lippitt's change theory.

The Comparison of Lippitt's change phases and the nursing process:

1. Assessment—This is where participants' information on their biographic data, history, social details, weight, height, HbA1c and other important information were taken from the questionnaire. The participants also filled out the questionnaire about their dietary habits. This stage is considered the same as that of the initial stage of nursing process.
2. Planning—after assessment, collaboration was made with the patients, the family and other team members to determine how to meet the education needs of participants in the experimental group.
3. Implementation—Participants in the experimental group were educated individually on a *Low-fat diabetes diet* and a plan documented.
4. Evaluation—the process was evaluated and the goals of lowering the BMI and HbA1c on the experimental group were met (Figure 3).

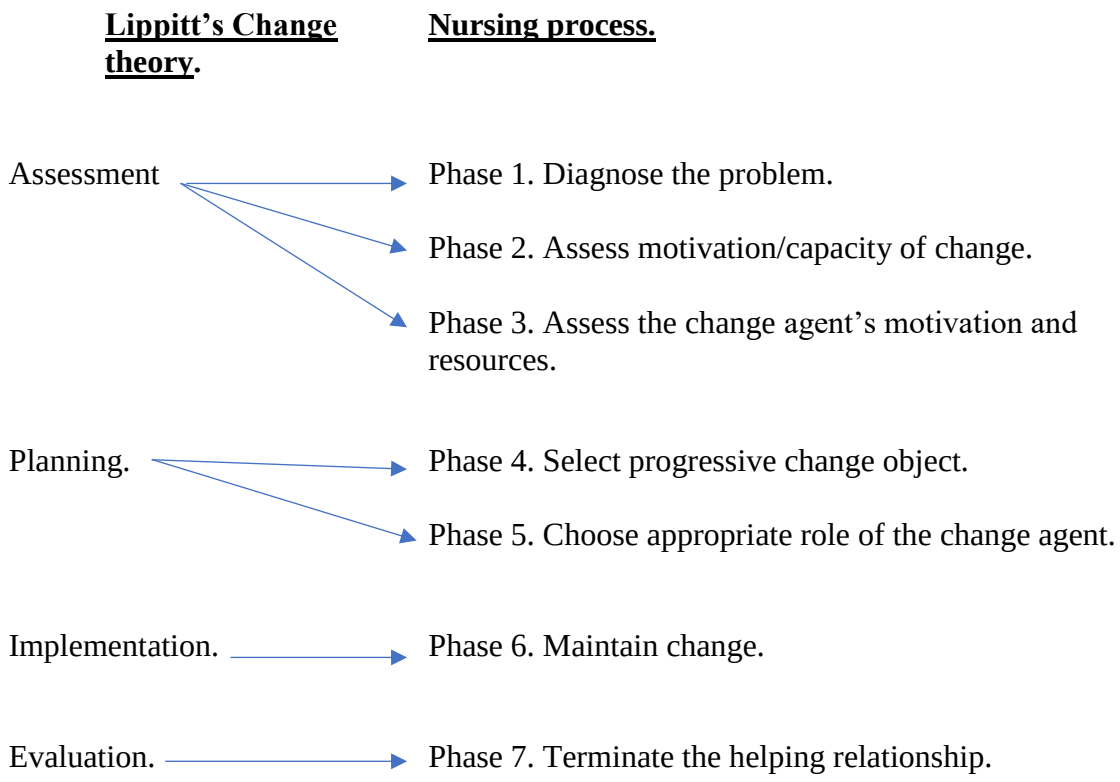


Figure 3. Comparison of Lippitt's change theory and Nursing Process.

Conclusion

Given the proven benefits of diet education for diabetics and the endorsement of the ADA for such a strategy, why is there still alarming statistics for diabetes? A survey by Ball et al. (2012) revealed that patients with DMT2 are not receiving nutrition education or any other essential education for the management of diabetes. There is a large gap between the recommendations and current practice. To close the gap, primary care providers should educate patients on a regular basis during clinic visits.

A higher HbA1c level and BMI among the African-American/Black population is an indication of poor glycemic control, which is attributed to inadequate self-care Behaviors (Gumbs, 2012). This calls for education intervention on diet management.

When teaching meal planning, care providers should remind patients to choose (1) healthy carbohydrates—fruits, vegetables, whole grains, low-fat dairy products, and legumes such as beans, peas, and lentils (Mayo Clinic, 2017); (2) heart healthy proteins rich in omega-3 fatty acids which lower blood fats called triglycerides—fish such as salmon, mackerel, tuna, sardines and bluefish; tuna and codfish also have less total fat than high-fat meats. A high-fiber diet is recommended since fiber moderates how the body digests food and helps control blood sugar levels. Vegetables, fruits, nuts, legumes are all high in fiber. Foods that should be avoided by those who have DMT2 include fatty meat, fried foods, whole milk products, cakes, candy, cookies, crackers, pies, salad dressing, lard, shortening, stick margarine, and nondairy creamers (CDC, 2016a*).*

CHAPTER 3

METHODOLOGY

Introduction

DM is a syndrome characterized by disordered metabolism and inappropriate hyperglycemia due to deficiency in insulin secretion or resistance to secreted insulin (Papadakis et al. 2017). This results in complications such as diabetic retinopathy, blindness, renal failure, and amputations (Gumbs, 2012). Despite these complications, there has been a rise in DM over time according to Balducci et al. (2015) and it is predicted that 592 million people worldwide will be diagnosed with DM by the year 2035.

In addition to the adverse effects that diabetes causes to the human body, there is also a financial burden. Getek et al. (2014) highlighted the high cost of managing this disease. Direct medical costs for diabetes care in 2007 were estimated to be $116 billion while indirect costs for disability and premature death were estimated at $58 billion. This calls for education and proper management of this disease to be a top priority in order to prevent loss and the development of complications (Buttaro et al., 2017).

In this project, the intervention was to educate an experimental group so that they could change their diet habits and bring about changes in diabetes. The participants completed pre- and post-test questionnaires, which were compared with responses from the control group who also completed the pre- and post-test questionnaires. The first page of the questionnaire contained questions about demographics, BMI readings, HbA1c

levels, while subsequent pages had 25 questions on food and diet habits. The pre-test results for BMI, HbA1c, and food factoring of the experimental and control groups were compared at the end of the project.

The total number of participants who completed the study was 63. Thirty-three of the participants were in the control group and 30 in the experimental group. Those in the control group did not get any *Low-fat diabetes diet* education, while each participant in the experimental group had three sessions of education lasting 20-30 minutes.

Participants were categorized based on their age range as they self-reported (18-29, 30-44, 45-59, and > 60). The participants self-reported whether they were working or not, and whether they were renting or owned a house. They self-reported their best level of education (no formal, primary, secondary and college and above). The participants were also to check on the questionnaire if they consider themselves male or female and the type of diabetes therapy, they were getting whether oral therapy, insulin therapy or combined therapy. The participants were to indicate whether they had knowledge of the *Low-Fat diabetes plate method* or not.

The *Fat-related Diet Habits* (https://sharedresources.fredhutch.org/about) questionnaire had questions such that the participants had to choose whether, when eating meat, they removed the fat. The first section asked whether or not they ate certain fatty foods. They chose from the following responses (yes (1), no (2), or (not applicable-n/a) The next step was to select how often they eat the fat-related food. The responses on the questionnaire were based on a four-point scale (1 = usually or always, 2 = often, 3 = sometimes, 4 = rarely or never). Participants' choices were then coded 1 through 4 to correlate positively with fat intake. The lower the scores, the lower dietary fat intake and

the higher the score, the higher the dietary fat intake. Total points were added according to the questionnaire instructions and analysis was done thereafter by a statistician.

Project Design

An analytical experimental research design was used to implement an educational intervention on diabetes dietary habits, in order to equip experimental participants with *Low-fat diabetes diet* knowledge. This project required of an education on healthy foods in order to facilitated healthy eating habits among patient with DMT2. Quantitative data was collected at the beginning, and at the end of, three months. This was an unblended randomized control project on adult patients with DMT2 at BHHC.

The study took place from May 2018 to October 2018. Groups were assigned randomly by choosing sealed envelopes for the control or experimental group. The control group did not receive any education but filled out the questionnaire at the beginning and end of three months. The experimental group received education after signing consent forms at the beginning of the study.

Hypotheses

- Hypothesis 1: There will be a significant decrease after three months in HbA1C and BMI measurements for experimental subjects who were given ***Low-fat diabetes plate*** diet education and no significant decrease in HbA1C or BMI for those who were in control group and did not receive this diet education.
- Hypothesis 2: There will be a significant decrease in the sum score of the "five fat-lowering factors" tool in the experimental group that receives diet education and no change in the sum of the control group "five fat-lowering factors" scores.

- Null hypothesis 2: There will be no significance difference in HBA1C and BMI measurement of those who received *Low-fat diabetes plate* diet education.
- Null Hypothesis 1: There will be no significant decrease in the sum score of the "five fat-lowering factors" tool in the experimental group that received diet education.

Population and Sample

The population in this project consisted of African-American/Black patients, 18 years old and older who have DMT2 and are patients at the Benton Harbor Health Center (BHHC). The study recruited 120 potential participants, of which 102 chose to sign consents and participate in the study. The participants randomly selected from 102 sealed envelopes that contained either "group one" which was control group or "group two which was "experimental group". At the beginning of the study, there were 51 participants in each group and at the end of the study, there were 33 participants in the control group and 30 participants in the experimental group. Of the 63 participants in total who completed the study, 36 (57%) of them were over 60 years old.

Participants were recruited from a convenient sample after reviewing charts at the clinic that contained a diagnosis of diabetes. An additional number of patients with diabetes type two were invited to participate during their regular doctor's visit to the BHHC. The subjects were determined based on the inclusion criteria in the patient health information charts.

The inclusion criteria were patients 18 years and older, diagnosed with DMT2 and of African-American/Black descent according to the patient's charts. They all agreed to freely participate in the project by signing a consent form, knowing that they could stop

voluntarily at any time during the project. The exclusion criteria applied to patients participating in any other DM program, patients who declined to participate, patients who identified with races other than African-America/Black, and patients who did not have DMT2.

The project was conducted at the BHHC in Michigan, where the project manager was assigned for clinical rotations and saw the need for diabetes education in that clinic. Permission was granted from both Andrews University and the chief medical officer at the BHHC. The clinic is non-profit and serves a mostly underprivileged population of the African-Americans/Blacks. Transportation, housing, employment, and appropriate foods for good nutrition are a challenge to most of the patients attending the clinic. The study was done to each individual in order to accommodate each participant's challenges to access health care and recommended healthy foods in order to effectively manage diabetes disease.

Measurements and Instruments

At the BHHC, all those who signed the consent forms were invited to measure their weight and height. BMI was calculated for all participants from the weight and height recorded for each patient. Their HbA1c was then checked using a simple needle stick and the blood drop was put in a professional HbA1c kit provided by the project manager. The results were recorded after five minutes and communicated to the patient. Those in the control group went home after completing the questionnaire while those in experimental group were educated on a *Low-fat diabetes* diet before they left the clinic. Follow-up was done after six weeks for those in the experimental group, and for those who did not make it to the clinic, a phone meeting was done. The final session was

completed after 12 weeks for all subjects in both groups to measure BMI, HbA1c, and to complete the post-test questionnaire. Those in the control group received no post-education while the experimental group was given a post-test education session.

Intervention and Data Collection

All the project participants completed pre- and post-test Fat-Related Diet Habits questionnaires. The first part of the questionnaire had demographic questions, followed by 25 questions on food and diet habits. There was a twelve-week interval between the pre-test and post-test.

Patients were educated individually during clinic visits before or after they saw their provider, as convenient. The ADA (2017a) recommends that diabetes treatments and interventions should be done in a timely manner based on individual preferences, prognosis, and comorbidities. Members of the experimental group were educated on the *Low-fat diabetes diet*, foods low on the GI, and the *My Plate* diet. Proper nutritional therapy can lead to a decrease of HbA1c of 0.5-2% for people with DMT2 if they implement the proper diabetes diet education (ADA, 2017e).

The HbA1c levels were checked for all participants at the beginning of the study and at the end of three months. The ADA (2013) recommends an individual glycemic level of < 7%, (53 mmol/mol). The BMI was calculated at the beginning and end of study (three months apart). Each participant's weight was taken (in kilograms) and height (in meters square), then the BMI was calculated using the Friedewald formula (kg/m^2) (Cao et al., 2018). The BMI of < 18.0kg/m^2 is considered underweight, the normal weight is 18.5-24.9 kg/m^2, overweight is 25.0-29.9 kg/m^2, and obesity is ≥ 30.0 kg/m^2. It is recommended that individuals should have a normal BMI of 18.5-24.9 kg/m^2, and those

with a BMI of above 25.0 kg/m^2 are considered at risk of developing T2DM (ADA, 2017b).

Implementation

Demographic data was collected using a demographic sheet and a modified 25-item *Fat-related Diet Habits* questionnaire that was completed. Questions were systematic, structured, and purposeful (Tappen, 2011). Some data was collected from questionnaires, medical records, and patients in the project. Data collected included (1) patient's marital status–single, married, separated, divorced, widowed, or living with a partner; (2) education attainment–eighth grade, high school, college, graduate education; and (3) employment status—retired, working, or unemployed. This information is also important when planning for DM management (Jones et al., 2006). Information on housing, food, and financial barriers should also be explored and applied to treatment and the diet education plan (ADA, 2017b).

Participants were categorized based on the age range they self-reported (18-29, 30-44, 45-59, and > 60). The participants self-reported whether or not they were working, and whether they were renting or owned their home. They self-reported their best level of education (no formal, primary, secondary and college and above). The participants were also to check on the questionnaire whether they considered themselves male or female and the type of diabetes therapy, they were getting whether oral therapy, insulin therapy or combined therapy. The participants indicated whether or not they had knowledge of the Low-fat diabetes plate method.

Method of Teaching

Participants in the experimental group were educated individually as it has been shown to be effective to take individual learning challenges into perspective (Phillips, 2016). Patients' cultural preference, knowledge level, individual access to recommended foods, barriers to making nutritional changes, and readiness for change were assessed and addressed accordingly (ADA, 2013). Kullgren et al. (2017) proposed that teaching could be done during primary care visits. The participants in the experimental group preferred to be educated during their office visits rather than to come at another time for education alone, hence saving money and time for another trip.

Gumbs (2012) conducted a study in which a majority (53.6%) of the sample had taken a course or class in managing their DM. Almost half of the participants, 1,303 or 45.0%, had never taken a class in how to manage their DM. This statistic increases the duty of primary care providers to educate patients with DM any time they have an encounter. Lack of education causes a lot of mismanagement in DM, a reason to equip primary care providers so that they will educate patients and equip them with knowledge they need in order to make informed changes in their diet.

Procedure

The following steps were taken during the project (Habibzadeh, Sofiani, Alilu, & Gillespie, 2017).

1) Participants were recruited and those who willingly agreed to be part of the project signed a consent form.
2) Participants randomly choose the group to belong by picking a sealed envelope that had one card inside with the word group 1 (control) or group 2 (experimental).

3) The experimental group received the intervention of diabetes diet education while the control group did not.
4) Members of the experimental group individual session lasting 20-30 minutes.
5) Follow-up was done at six and twelve weeks with the experimental group.
6) Participants were invited to call the clinic during office hours for any questions or concerns.
7) Those lost from study were left out during data analysis.
8) Data was analyzed.

Education Sessions

Session 1. Session 1 was done for 20-30 minutes at the beginning of the study. It was started by introduction of the project, and the reasons why the BHHC was chosen as the site of this project. Signing of the consent forms was completed after the patients stated they understood the nature of the project and all the concerns and questions had been addressed. All the participants who signed the consent were then given a chance to choose a sealed envelope that had a card inside with “group one” or “group two” on the card. Those who had “group one” now belonged to control group and those who picked an envelope with “group 2” inside belonged to the experimental group. For group one, weight was taken (in kilograms) and height was taken (in meters). The BMI was then calculated and recorded. The pre-test questionnaire was filled out and after that, the finger pricking procedure was then explained in order to get a small drop of blood for checking HbA1c, the same procedure that is used for checking blood sugar. Results for HbA1c were displayed after five minutes. The Multi-test HbA1c system was used. The

participants in the control group were then told to return after three months for the post-test of HbA1c and BMI, and the filling out of the post-test questionnaire.

During session 1, those who were assigned to the experimental group had their pre-test BMI calculated, HbA1c was checked, and they completed the pre-test questionnaire. A brief introduction of diabetes was given, and its complications were discussed, which included changes that lead to hypertension, end-stage chronic kidney disease, blindness, autonomic and peripheral neuropathy, and amputations of lower extremities, myocardial infarction, and cerebrovascular accidents among others. They were introduced to the *Low-fat diabetes plate* method of eating for patients with DMT2. Food portion demonstrations were given, showing patients how food should be arranged on the plate (diabetes food portions). The ADA (2017c) suggests filing one-half of a plate with non-starchy vegetables, such as spinach, carrots and tomatoes. The next, step was filling one-quarter with a protein such as tuna, lean meat, or legumes for best results. The last quarter was filled with a whole-grain item for better glycemic control.

To reduce fat content in food, participants in the experimental group were educated on substituting specially manufactured, low-fat foods for high-fat foods, such as using skim milk instead of whole milk. They were also taught to trim fat from meat, to replace high-fat foods with low-fat foods such as fruits and vegetables, and to avoid fat as a spread. Participants also learned it is important to avoid frying foods, but instead to boil, bake, steam or broil. Materials about food planning were given to them to take home as reminders.

Session 2. Session two was done for 20-30 minutes six weeks after session one. This time was used to assess any barriers experienced and to ask if goals were being met

for eating a *Low-fat diabetes* diet. Most patients were concerned about the fact that choosing different foods is a challenge as opposed to continue eating what they have been used to eat for years. Most patients complained about skin milk or 1% milk not having a good taste to them, but they were encouraged and motived in view of the advantages that are gained when a *Low-fat diabetes diet* is consumed. Questions and concerns were addressed. Participants were assisted in identifying helpful resources like a soup kitchen and (ADA, 2002) where they can learn more about diabetes. No measurements were taken at this session. A phone session was an alternative for those who did not make it to this second session.

Session 3. This session was done at 12 weeks for an average of 20-30 min. Post-test questionnaires were completed, post-test HbA1c level and post-test weight and height were taken. The same education was given to the experimental group, which was done during session one. Wrapping up of everything and thanking the participating in the study took place at the end of this session.

Data Collection Tool

Demographic page. The demographic page of the questionnaire used had gender (male or female), age range (18-29 years, 30-44 years, 45-59 years, and >60 years); BMI (kg/m^2); education (No formal education, primary level, secondary level, college/ university level); diabetes duration (in years), and work status (yes or no). It also collected information on anti-diabetes therapy (oral agents only), (combined therapy), (insulin therapy only); housing (own house or rent); HbA1C level (%); any Low-fat diabetes plate knowledge (Yes, No).

Low-Fat habit questionnaire. The *Fat-related Diet Habits* questionnaire was used in this study. This tool was created to assess eating habits related to a low-fat diet (Hendrychova et al., 2013). This tool had been used with diabetes patients previously. It had been tested and found reliable for use in such projects. The tool assesses the following five factors related to diet.

Factor 1—Substituting specially manufactured low-fat foods (fat-free or skim milk)

Factor 2—modifying meat (trimming all the fat from the meat before cooking it).

Factor 3—avoiding frying food (baking, broiling, steaming, or boiling instead).

Factor 4—Replacing high-fat foods with low-fat foods such a as fruits and vegetables.

Factor 5—avoiding fat as a spread or flavoring.

These five factors were used to describe changes to a low-fat diet and whether or not participants reported an increase in the use of manufactured, low-fat foods and modified meat, whether they avoided frying foods, whether they replaced high-fat foods with low-fat foods like non-starch fruits and vegetables; and whether they avoided using fat as a spread or flavoring (Hendrychova et al., 2013). The responses on the questionnaire included a four-point scale for responses (1=usually or always, 2=often, 3=sometimes, 4= rarely or never). The lower the scores, the lower dietary fat intake; and the higher the score, the higher the dietary fat intake.

Methods for Analyzing Data

Descriptive analysis was used to describe the demographic data, while t-test statistics was used to show a correlation between the independent and dependent variable. Statistical significance will be tested using p-variable of 0.05. Any p-value computation less than 0.05 is considered statistically significant.

CHAPTER 4

ANALYSIS AND RESULTS

Introduction

The data collection tools used in this project were a demographic questionnaire and a *Fat-related Diet Habits* questionnaire. This had 22 food items and three items were added regarding the diabetes plate method for a total of 25 questions. Data were collected during a 6-month period, from May to October 2018. The sample originally consisted of 102 participants but only 63 of them completed the study. The 39 who dropped out were omitted from the study and their results were not reported.

All the participants were African-American/Black adults, 18 years or older. Participants were diabetic male and female who were attending only the BHHC. Data were entered first into Excel using Microsoft Office 2016. Then, they were crosschecked by another researcher to control any typing errors. Descriptive statistics and inferential analysis were performed using SPSS version 22. Pairwise t-tests were used to compare means between the pre-intervention and post-intervention groups, and independent sample t-tests were used to compare means between subjects. The 95% confidence level was used to test for significance.

Participants' Age Range

The control group had 11 participants in the 45-60-age range. More than half (19) the participants were older than 60. The experimental group had 11 participants in the 45-60-age range and more than half the participants (17) were above age 60 (Figure 4). Both groups had their highest number of participants in the age range of > 60. The general results indicate that 57.1% of the entire study population was > 60 years and 34.9% of the study population were in the age range of 45-59 years.

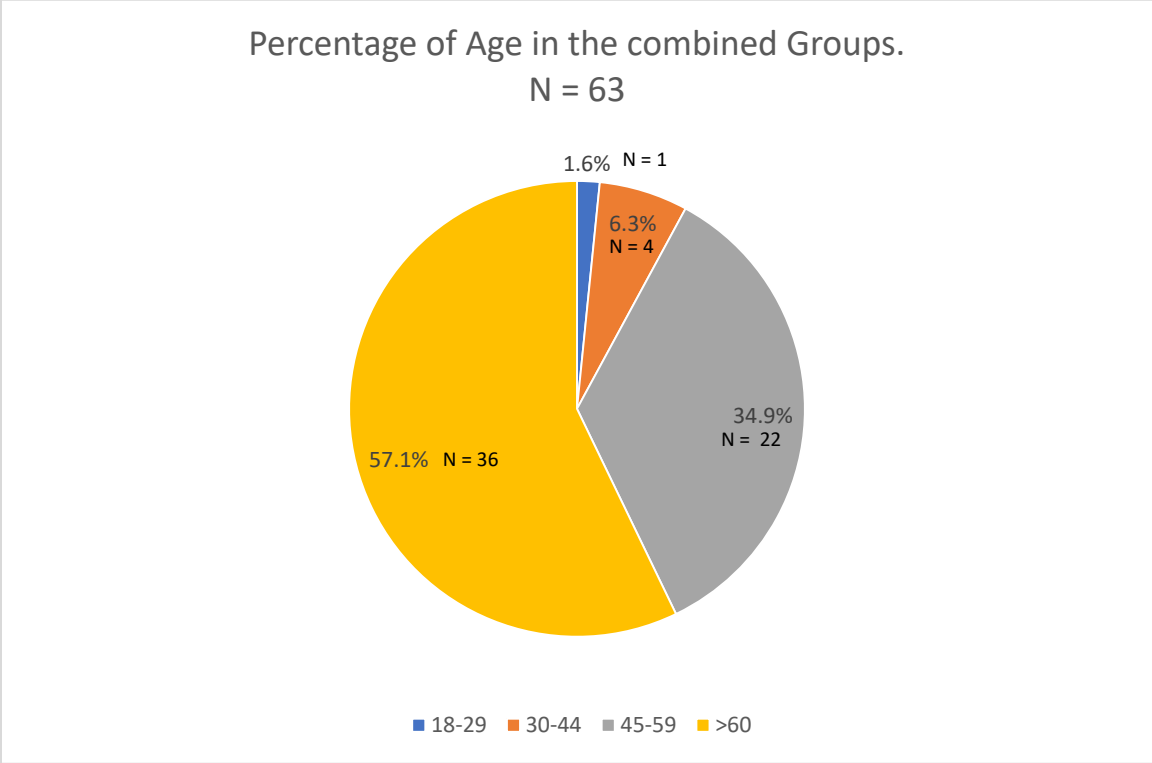


Figure 4. Participants' age for both groups.

Employment Patterns of the Entire Study Group

The control group had only eight (24.2%) employed participants out of 33 participants while the experimental group had seven (23.3%) employed participants of

30. Therefore, 75% of participants in the control group and 76.7% of participants in the experimental group were not working. The results of the entire study indicated that most of the study participants (76.2%) were not employed (See Figure 5).

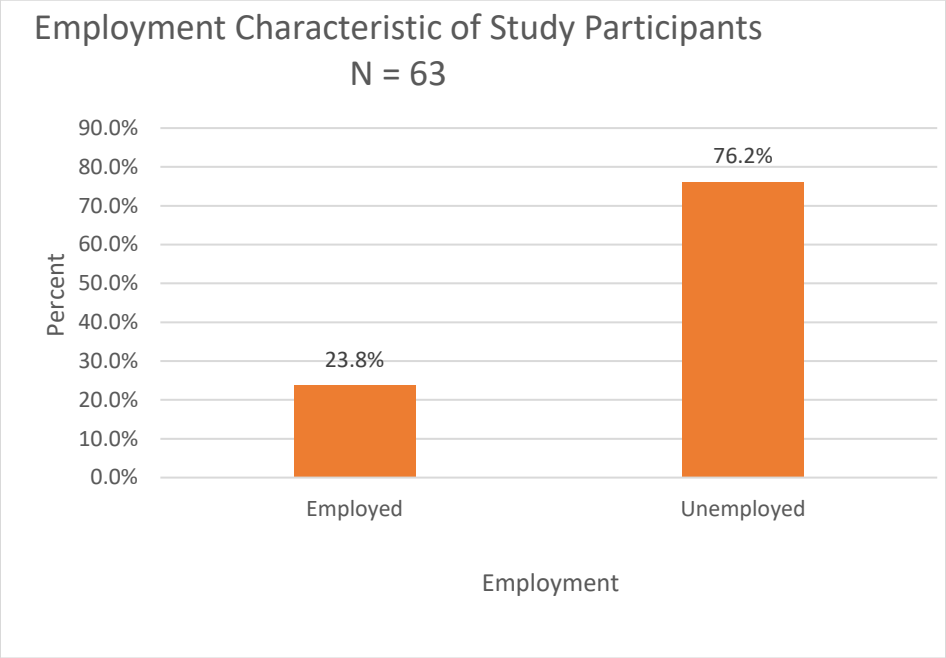


Figure 5. Employment characteristics for study participants.

Participants' Housing

Only 42.9% of all the participants owned their house, while the majority (75.1%) was renting (Figure 6).

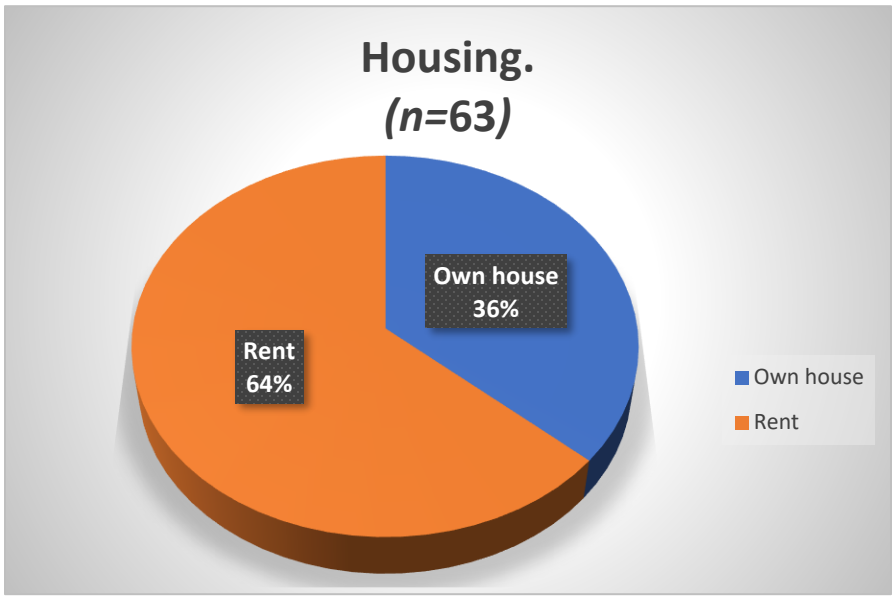


Figure 6. Participants' housing.

Participant's Education Level

Of the 33 participants in the control group, there was one (3%) without any formal education, nine (27.3%) with primary level education, fifteen (45.5%) with secondary level education, and eight (24%) with college level education. Most people in the control group had a secondary level of education. Of the 30 participants in the experimental group, none was without any formal education, nine (30.0%) had primary level education, 14 (46.7%) had secondary level education, and 7 (23.3%) had collage level education. As with the control group, most participants in the experimental group had a secondary level of education (Figure 7).

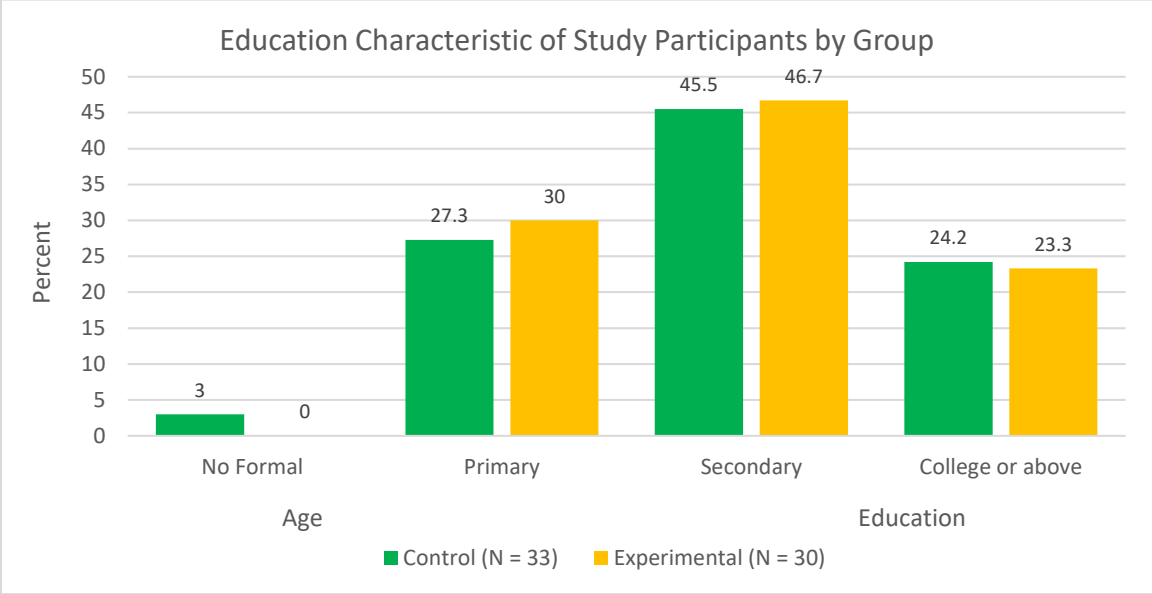


Figure 7. Participant's education.

Participants Gender

The control group had 17 males (51.5%) and 16 females (48.5%), for a total of 33 participants who completed the pre- and post-questionnaires. There were more males than females in the control group (Figure 8). The experimental group had 14 males (46.7%) and 16 females (53.3%), for a total of 30 participants who completed the pre- and post-questionnaires. There were more females than males who completed the study in the experimental group (Figure 9).

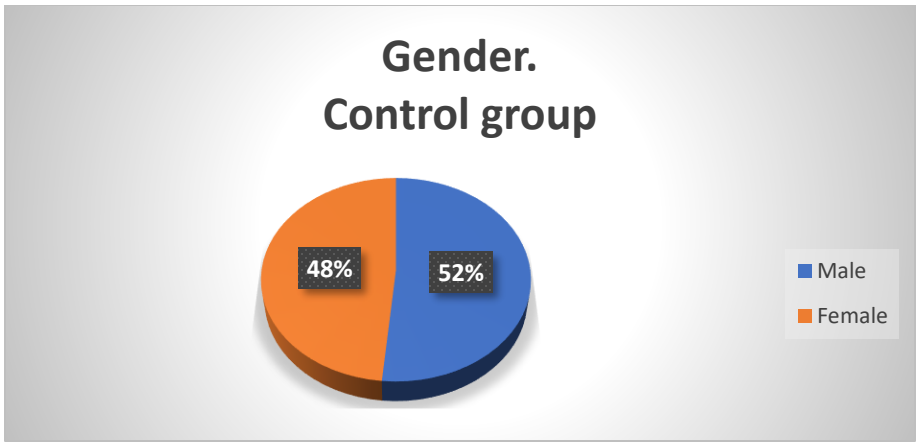


Figure 8. Participants' gender for control group.

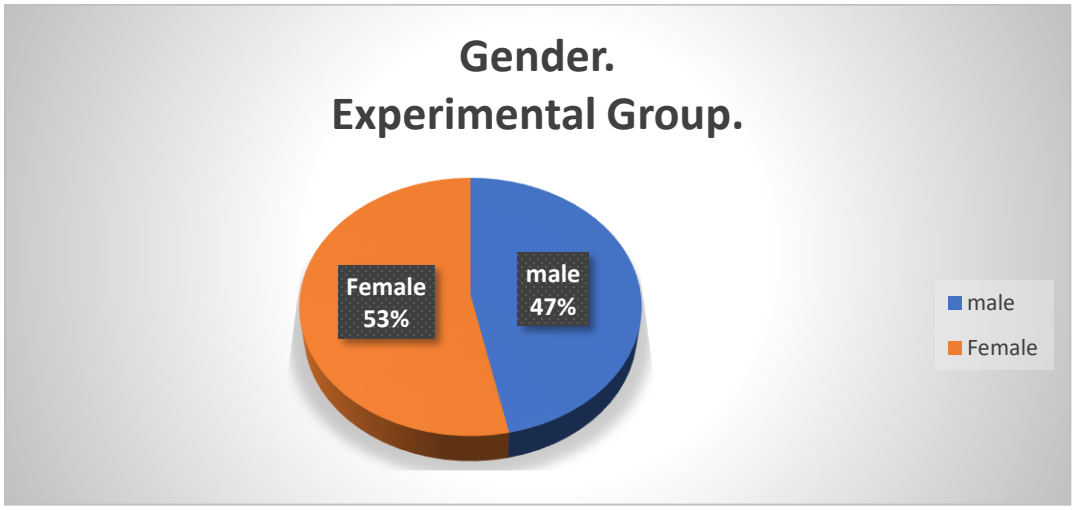


Figure 9. Participants' gender for experimental group.

Diabetes Therapy

Most of the participants in both groups reported taking oral anti-diabetes medications (70%). Those taking a combination of insulin and oral anti-diabetes medication were 22% of the total participants while those taking only insulin to manage their diabetes were only 8% of the total population (Figure 10).

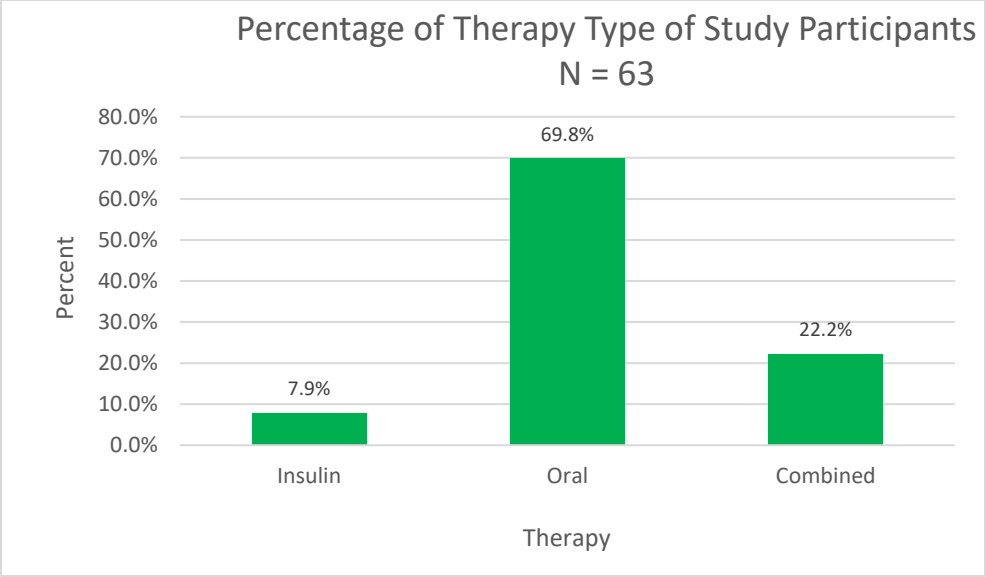


Figure 10. Participants' diabetes therapy.

Knowledge of *Low-fat Diabetes Diet* Plate

Pre-test results. The results show that 58 % of the participants in the control group had some knowledge about a diabetes diet while 42% had no knowledge. This is a challenge because even when we think that everyone with diabetes knows what to eat, the results show that many participants did not have the knowledge of the foods they should eat (Figure 11).

In the experimental group 57% of the participants had some knowledge of diabetes diet, while 43% did not. This presented the opportunity for educational intervention and by the end of the study all the participants in the experimental group had some knowledge of what they should eat (Figure 12).

Post-test results. After the study was completed, 76% of the participants in control group reported that they had some knowledge of the diabetes diet, while 24% stated that they did not have any knowledge of the diabetes diet (Figure 13).

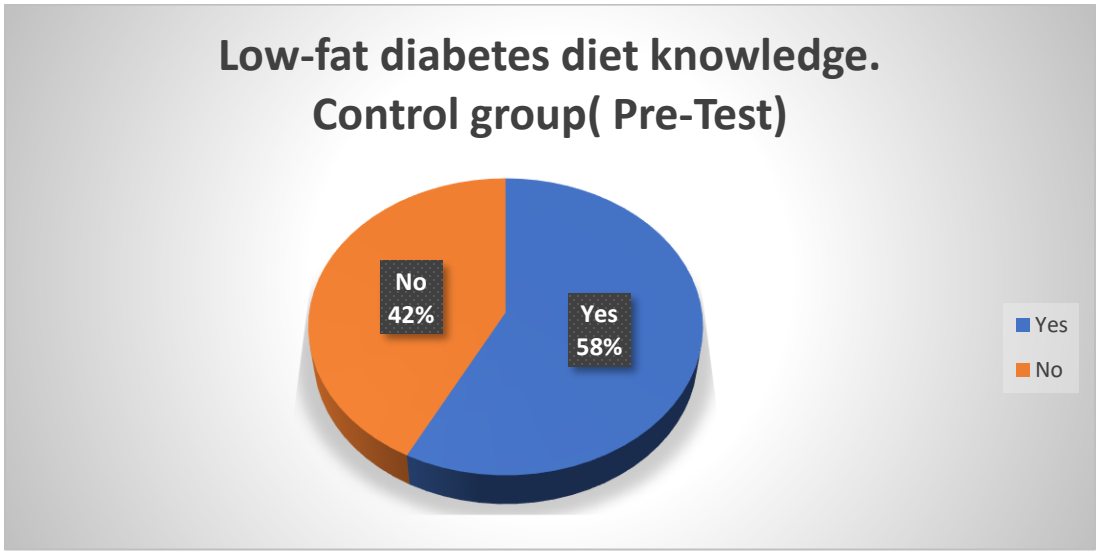


Figure 11. *Pre- Diabetes Low-fat diet knowledge (control group).*

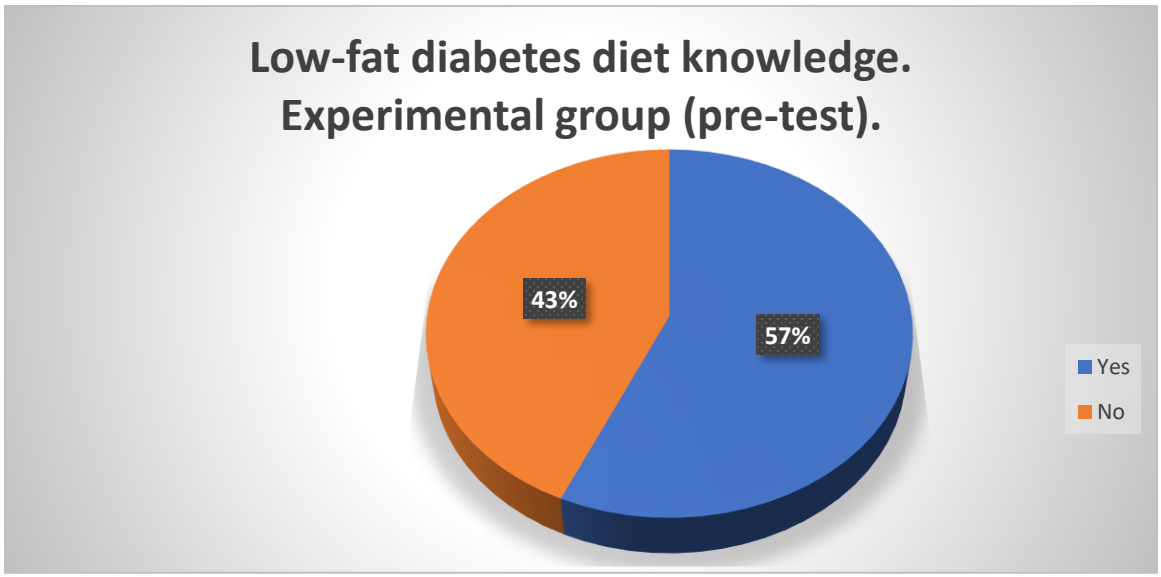


Figure 12. *Pre-test of* Low-fat diabetes diet *knowledge (experimental group).*

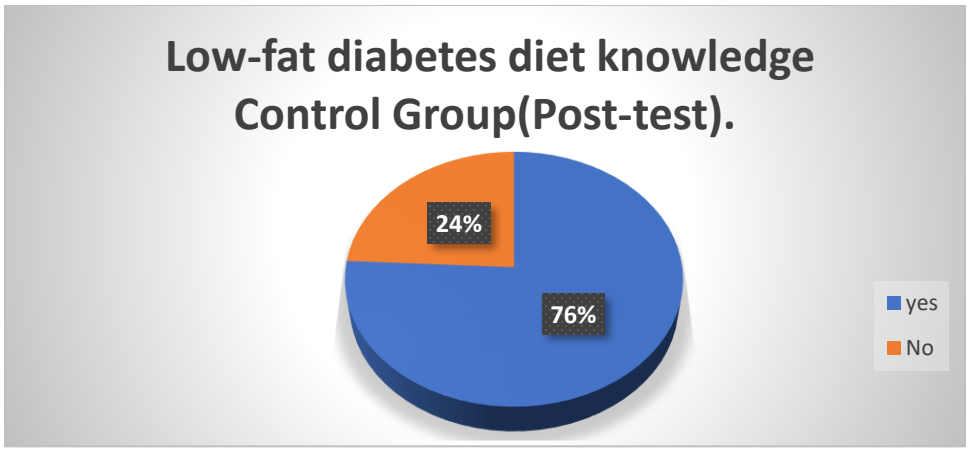


Figure 13. Post-test, *Low-fat diabetes diet* knowledge (control group).

All the participants (100%) in the experimental group had knowledge of the *Low-fat diabetes diet* by the end of the study period (three months).

Number of Years Participants Had Diabetes

Control group. Of the 33 participants in the control group, five (15.2%) had diabetes for 10 years and four (12.1%) for 20 years. Three participants (9.1%) had diabetes for one year; three others (9.1) had diabetes two years and another three (9.1%) had diabetes for three years. Two participants (6.1%) had diabetes for at least four years, two participants (6.1%) had diabetes for at least 5 years, two participants (6.1%) had diabetes for at least 11 years, two participants (6.1%) had diabetes for at least 40 years, two participants (6.1%) had diabetes for at least 18 years and another two participants (6.1%) had diabetes for 7 years. One participant (3%) had diabetes for 16 years, and another (3%) had diabetes for 19 years. Only one participant (3%) had diabetes for 50 years, the longest of any participant.

Experimental group. Of the 30 participants who were in the experimental group, seven participants (23.3%) had diabetes for 10 years and six participants (20.0%) had diabetes for one year. Three participants (10.0%) had diabetes for 11 years while three more participants (10.0%) had diabetes for 20 years. Two (6.7%) participants had diabetes for 5 years, two (6.7%) for 15 years, and two (6.7%). Only one participant (3.3%) each had diabetes for 3, 7, 12, 17, and 25 years respectively. The longest a participant in the experimental group had diabetes was 25 years of diabetes.

Participants' General Characteristics

There were 63 participants in the project, and of those, 47.8% were in the experimental group. The results show that more than half of the participants in each group were over 60 years old and had already had knowledge about the *Low-fat diabetes Plate Method* prior to joining the project (Table 1).

Variables

BMI and HbA1c

After three months of post education intervention, significant reduction in the study measures were recorded. Paired sample t-tests showed a significant decrease in BMI and HbA1c. The mean BMI for the pre-test experimental group was 39.6, which significantly decreased to 38.6 after the intervention ($t = 3.071$, $df = 29$, $p = 0.005$). Likewise, the mean HbA1c for the pre-test experimental group was 8.33, which significantly decreased to 7.21 after the intervention ($t = 3.219$, $df = 29$, $p = 0.003$). The control group did not show any significant differences between pre and post-test for these variables (Table 2).

Factoring

The factors were used to describe when a diet is of low-fat by assessing whether there is substitution for manufactured low-fat foods, modified meat, avoiding of fried foods, replacing high-fat foods with low-fat foods like non-starch fruits and vegetables, and avoiding the use of fat as a spread or flavoring (Hendrychova et al., 2013). The responses on the questionnaire were on a four-point scale (1=usually or always, 2=often, 3=sometimes, 4= rarely or never). The lower the scores the lower dietary fat intake and the higher the score the higher the dietary fat intake.

Table 1

Sociodemographic and Clinical Characteristics of Diabetic Respondents [a]

Characteristic	Group				Total	
	Experimental		Control			
	N (30)	%	*N* (33)	%	*N* (63)	%
Sociodemographic						
Age						
18-29 years	-	-	1	3.0	1	1.6
30-44 years	2	6.7	2	6.1	4	6.3
45- 59 years	11	36.7	11	33.3	22	34.9
>60 years	17	56.7	19	57.6	36	57.1
Gender						
Male	14	46.7	17	51.5	31	49.2
Female	16	53.3	16	48.5	32	50.8
Education						
No formal education	-	-	1	3.0	1	1.6
Primary Level	9	30.0	9	27.3	18	28.6
Secondary Level	14	46.7	15	45.5	29	46.0
University Level	7	23.3	8	24.2	15	23.8
Working						
Yes	7	23.3	8	24.2	15	23.8
No	23	76.7	25	75.8	48	76.2

Table 1—*Continued*

Housing						

Own a house	12	40.0	15	45.5	27	42.9
Renting	18	60.0	18	54.5	36	57.1
Clinical Characteristics						
Diabetes duration (Mean ± SD)	(10.37 ± 6.9)		(12.21 ± 12.0)		(11.33 ± 9.9)	
Diabetes treatment						
Insulin Only	1	3.3	4	12.1	5	7.9
Oral Agents[c]	24	80.0	20	60.6	44	69.8
Insulin and Oral agents	5	16.7	9	27.3	14	22.2
Prior knowledge[d]						
Yes	17	56.7	19	57.6	36	57.1
No	13	43.3	14	42.4	27	42.9

SD: Standard deviation
[a] Self-reported
[b] Number of years since they knew they had diabetes
[c] Oral hypoglycemic agents
[d] Prior knowledge of Diabetes Plate Methods

Factor 1—substituting specially manufactured low-fat foods.

Factor 2—modifying meat.

Factor 3—avoiding frying food.

Factor 4—replacing high-fat foods with low-fat foods such a as fruits and vegetables.

Factor 5—avoiding fat as a spread or flavoring.

Factor 1. This factor involved substituting specially manufactured low-fat foods like skin milk or 1% milk for whole milk. The control group showed a significant

reduction in this factor (t = 1.97, df = 32, sig. = 0.57), indicating that most participants substituted their diet with low-fat foods. There were no significant changes in the experimental group.

Factor 2. There were no significant changes in this factor for any of the groups based on pre-test and post-test results. Factor 2 results show no changes in any of the results for both groups indicating that none of the groups modified meat. Trimming all the fat before cooking can modify meat.

Factor 3. There were no significant changes in this factor for the control group for pre- and post-test results. The experimental group had a significant change in the results (t=4.98, df=29, sig=.000). This post-test results indicated that the experimental group avoided frying foods and instead baked, broiled or boiled.

Factor 4. The results indicated no significant changes in any of the groups during pre- and post-test results. Participants need to learn how to replace high-fat foods with low-fat foods. Eating apples rather than apple pie can be one of the ways this could be done.

Factor 5. The results indicated no significant changes in any of the groups during pre- and post-test results.

BMI, HbA1c, and Factoring Results Display.

Overall, a significantly (p = .057) lower-fat diet was consumed by the experimental group by the end of the study period, indicating a positive impact of the education intervention during this study (Table 2). The Cohen's d = .33.

Table 2

BMI, HbA1c, and Factoring for All Groups.

Variable	Pre-test		Post		Statistics
					t (*df* = 61)
	M	*SD*	*M*	*SD*	
BMI-control	34.03	7.70	33.33	7.13	1.272, *df* = 32, sig. = .212
BMI-experim	39.60	8.84	38.59	8.84	3.071, *df* = 29, sig.= .005*, Cohen's *d* = 0.11
HbA1c- control	7.92	2.06	7.73	2.14	-.602, *df* = 32, sig. = .551
HbA1c-experim	8.33	2.81	7.21	2.30	3.219, *df* = 29, sig = .003* Cohen's *d* = 0.44
Factor 1-control	3.37	0.57	3.16	0.42	1.972, *df* = 32, sig. = .057*, Cohen's *d* = 0.41
Factor 1-experim	3.35	0.58	3.22	0.70	-1.001, *df* = 29, sig. = .325
Factor 2-control	2.97	0.86	3.03	0.84	-.363, *df* = 32, sig. = .719
Factor 2-experim	2.79	1.03	2.87	0.84	.430, *df* = 29, sig. = .670
Factor 3-control	1.92	0.52	2.04	0.64	-1.113, *df* = 32, sig. = .274

Table 2—*Continued*

Factor 3-experim	1.80	0.62	2.39	0.78	4.988, *df* = 29, sig. = .000*, Cohen's *d* = 0.84
Factor 4-control	3.21	0.65	3.25	0.65	1.277, *df* = 32, sig. = .211
Factor 4-experim	3.20	0.53	3.13	0.29	-.507, *df* = 29, sig =.616
Factor 5-control	3.00	0.50	2.86	0.49	1.518, *df* = 32, sig. =.139
Factor 5-experim	2.92	0.54	2.83	0.53	-.688, *df* = 29, sig. = .497
Sum scores-control	2.97	0.31	2.88	0.41	1.139, *df* = 32, sig. =.263
Sums scores-experimental	2.80	0.48	2.97	0.55	1.980, *df* = 29, sig. = .057*, Cohen's *d* = 0.33

Asterisk (*) indicates significant difference < .05

The experimental participants ate less fatty food at the end of the study as evidenced by lower sum scores.

CHAPTER 5

DISCUSSION

The results of this project showed that people with DMT2 who receive appropriate diet education have better HbA1c control than those who are not educated. DMT2 is a chronic progressive disease that can lead to both micro vascular and macro vascular complications (Ciobanu, Clus, Moscu, Vereşiu, & Voman, 2013). DMT2 should be well controlled by monitoring the HbA1c so that the risks of short- and long-term complications can be reduced. HbA1c should be checked every 2-3 months to determine sugar control and any value higher than 7% requires lifestyle modification as the first line of management according to Ciobanu et al. (2013). Indeed, in this study, the mean HbA1c level of the participants significantly decreased by 1.12% after the three-month period with three sessions of education intervention per individual. The BMI level also decreased significantly by 1.01% in kg/m^2 after that same period. The control group did not have any significant reduction in their numbers.

The measurements reported in this project indicated that the mean HbA1c for the control group before the study was 7.9%, while the mean for the experimental group prior to the study was 8.3%. This clearly indicated that both groups had a need for lifestyle modification in order to lower the HbA1c values. At the end of the three months, the experimental group that had the education intervention had a decrease in mean HbA1c from 8.33% (pre-test) to 7.21% (post-test) which was a drop by 1.12%, with a

significance value ($p = 0.003$). This indicated that project the hypothesis one is accepted as there is a decrease in HbA1c on the experimental group while the control group did not have a significantly ($p = 0.551$) lower HbA1c, and the null hypothesis one is rejected which states that there will be no decrease in the experimental HbA1c after the three months of education intervention.

Individuals become increasingly at risk for development of DMT2 as they advance in age. The ADA (2017b) recommends screening for DM should begin at age 45, especially for patients who are overweight or obese and have other risk factors. After initial screening has been done and the patient is free of diabetes, screening should be repeated every three years (ADA, 2017b). The project result indicated that over 90% of the study participants were 45 years old and older, which matches with the knowledge that the risk of developing DMT2 increases after age 40 (McCance et al., 2013).

When gender is accounted for, African-American/Black females have the highest incidence and prevalence of DMT2. Among all the races, blacks have the highest risk of DMT2 (McCance et al. 2013), and this is why the project comprised of 100% African-American/Black population but the ratio of male to female was nearly identical with 32 females and 31 males.

The final product of this project is a printed brochure that can be used at the clinic to guide diabetes patients on how to choose the right foods for their consumption and how to prepare a *Low-fat diabetes diet*. Diabetes patients face unique health challenges and they need an individualized approach, like individual education so that their unique disease management challenges can be well addressed. Jansink et al. (2013) in their study concluded that patient-centered counseling and motivational interviews could be used for

health promotion and diseases management. In line with this, each participant in the experimental group of this study was given three educational session of 20-30 minutes. This resulted in better understanding and better results in BMI and HbA1c.

Obesity is a frequent contributing factor precipitating DMT2 development among susceptible groups. It is recommended that individuals should have a normal BMI of 18.5-24.9 kg/m², and those with a BMI of above 25.0 kg/m² should be considered at risk for developing DMT2 (ADA, 2017b). The mean BMI for the pre-test control group was 34.03 kg/m², while the experimental group had a mean BMI of 39.60 kg/m², which shows obesity in both groups. The post-test results showed a slight decline in the BMI of the control group from 34.03 kg/m² to 33.33 kg/m², but that change was not enough to be of any significance(p = .212). The experimental group had a post-test BMI of 38.59 kg/m², which was a 1% decrease, at the end of the three-month period for each individual of this project, indicating a significant reduction in BMI in this group.

The 1% decrease in BMI on the experimental group at the end of three months period with education intervention enables us to accept the project hypothesis one which states that there will be a significant decrease in BMI (p = .005) for the experimental group and no significant decrease in the control group BMI (p = 0.212) results after the three months with education intervention. The first null hypothesis is rejected which states that there will be no significant decrease in the experimental group BMI at the end of three months with education intervention.

This project was done to increase knowledge about the *Low-fat diabetes diet* for diabetes patients who attend the BHHC. The pre-test questionnaire results indicated that 42% of the participants in the control group and 43% of the participants in the

experimental group had no knowledge of any diabetes diet, let alone the *Low-fat diabetes diet*.

Most people in both the experimental and control groups reported a secondary/high school level of education and so they were able to understand the concepts presented in the materials about the *Low-fat diabetes plate diet.* This presents a challenge, in that even when providers believe that everyone with diabetes knows what to eat, the results show that a large portion of these participants did not have the knowledge of the foods they should eat while managing diabetes.

A proposed management strategy for DMT2 from Guo et al. (2014) included structured education to promote the ability of patients to self-manage and improve compliance with diabetes management, thereby preventing or reducing complications. There were increased self-care behaviors after attending the diabetes educational sessions, as reflected by improved HbA1c and lower BMI.

A diet that makes one obese can also predispose one to have diabetes since obesity has been highlighted as the number one cause of DMT2 in African-Americans/Blacks, according to Sattin, et al. (2016). Foods with a GI value of 55 or less should be eaten most frequently and they include many fruits, vegetables, grains, and legumes. Foods with a higher GI value of 70 or above should be avoided, including foods like white rice, white bread, and baked potatoes. Instead, patients should eat whole grains such as brown rice, wheat bread, and whole grain oats.

The *Fat-related Diet Habits* questionnaire used in this study was created to assess eating habits related to a low-fat diet. Five fat-related dietary patterns (factors) were studied. These factors describe whether a diet has changed in favor of low-fat choices by

assessing substituting for manufactured low-fat foods (factor 1), modifying meat (factor 2), avoiding frying foods (factor 3), replacing high-fat foods with low-fat foods like non-starch fruits and vegetables (factor 4), and avoiding using fat as a spread or flavoring (factor 5).

In factor 1, the control group in this project had improvements of some significance ($p = 0.057$), indicating that this group did increase their substituting of specially manufactured low-fat foods, for example, choosing skim milk instead of whole milk. The experimental group results indicated no significant results in factor 1. Factors 2, 4 and 5 had no significant changes in either group, indicating no improvement in trimming fat from meat, replacing high-fat foods with low-fat foods such as fruits and vegetables, and avoiding fat as a spread respectively were improved. For Factor 3, the experimental group had significant findings ($p = 0.000$) in food preparation indicating improvement in avoiding fried foods and the use of alternative means of food preparation like baking, boiling, broiling, steaming. The control group indicated no significant changes in Factor 3, indicating no improvement in the way they cooked meals.

Sum scores for the control group indicated no significant changes, showing no improvement on their sum scores for all five factors and so we accept our second hypothesis which states that there will be no significant changes in the sum scores ($p = .263$) of the control group after three months. The experimental group did have some significant findings ($p = 0.057$) in their sum scores, enables us to accept our second hypothesis that states that there will be a significantly lower score in the sum scores of the experimental group after a period of three months with diet education intervention.

The second null hypothesis is rejected which states that there will be no decrease in the sum score of the experimental group after three months with education intervention.

Deliverable Product of the Study

The pre-test results indicated that a lot still needs to be done in healthcare settings, especially in the outpatient primary care clinics where patients are seen daily, in order to ensure that all the diabetes patients get the diet education that they need. An outcome of this project will be specific guidelines to help facilitate *Low-fat diabetes diet* education for all diabetes patients in the BHHC where this project was completed. These guidelines will help equip DMT2 patients in the BHHC with information they need to make necessary diet changes. The expected end results will be lowed HbA1c and BMI for DMT2 patients similar to that demonstrated by the post-test results of the experimental group that received education intervention.

Limitations of the Study

The time that was taken to educate each participant (20 to 30 minutes) might not be available during regular primary care visits, thus, a summarized educational guideline that can easily be taught to all patients diagnosed with DMT2 during regular clinic visits was created. These materials can also be taken home for self-study and reviewed the next time the patient comes to the clinic.

This project was limited to Black/African-American population who attend the BHHC and findings may not be transferrable to different populations or settings since the African-American/Black population in this location face unique challenges like transportation, which affects their visits to primary care providers and follow-ups.

The total sample size of those who completes the project were all from one federally qualified health center serving an underserved area. The results from this study of 63 participants might not represent the entire population of African-Americans/Blacks, as a whole, or even within this particular clinic. The unique challenges facing this geographic location and underserved area may not be representative of other underserved African-Americans/Blacks.

Implications for Advanced Nursing Practice

Advanced nurse practitioners and other health care providers must be knowledgeable about barriers to patient learning in order to facilitate learning and achieve better outcomes among patients. Gumbs (2012) noted that African-American women have approximately 53.6% participation rate, which is below the minimum requirements of 62.5% in diabetes self-management education. African-American women suffer from DM complications because they lack adequate DM self-management education (Gumbs, 2012). This is a challenge for the health care providers to develop strategies and policies to improve participation among this ethnic population. Those who have DM education will be more involved in checking blood sugar and HbA1c hence reducing the risk of developing complications. The suggestion here is to integrate *Low-fat diabetes* diet education in every patient visit as some patients may not be able to come for other scheduled education sessions.

Nursing Education Implications

This project will inform academic curricula at all levels and specialties dealing with DMT2 of the importance of emphasizing diet education for patients with diabetes.

Nurse practitioner students who will be treating DMT2 patients in their future careers in primary care should have a clear understanding of the impact educating the patient on diet could have in helping patients achieve improved health outcomes. This project is meant to translate scientific evidence on *Low-fat diabetes* diet education, including simple food choices that the patients can utilize, in order to see positive change as measured by decreased HbA1c levels. Thus, the BHHC in Michigan and other communities at large will benefit from the scientific evidence from this study.

The final product of the research is to develop guidelines for the *Low-fat diabetes plate* diet for patients with DMT2, as recommended by the ADA (2017a) for the clinic where this project took place. It is recommended that this product be used during all routine outpatient visits for patients diagnosed with DMT2. This will allow for education on food choices and provide reminders and reinforcement for implementation of the *Low-fat diabetes plate* diet.

Nursing Practice Implications

Education on DMT2 should be incorporated into routine clinic visits of the patient with diabetes. The prime time for this is at screening, diagnosis, annual assessment, during office visits when there is transition in care, and whenever an opportunity opens (ADA, 2015a). This project highlights and gives guidance to clinical care providers, enabling them to maximize patient education when the patient needs it most. Providers need education in assisting patients in achieving these goals and help to incorporate this education into their routine care practices.

The diet guidelines suggested in this project are geared towards helping patients with diabetes to improve clinical outcomes and prevent development of complications or

reduce the impact of existing complications. Education about the *low-fat diabetes plate* diet will help patients improve diet choices. This should result in lower HbA1c levels and improved glycemic control.

Reflection

Much has been stated about how bad eating habits can cause diseases to our bodies. In the Bible, 1 Corinthians 6:19 reminds us that our bodies are temples of the Holy Spirit and so we should take good care of it by eating appropriate foods. In Leviticus 11, some of the meats that are considered clean include animals that have a split hoof completely divided and that chew the cud—cattle, buffalo, sheep, goat, gazelle, antelope, just to name a few. For example, pigs and rabbit are considered unclean since the rabbit does not have a split hoof and the pig does not chew the cud. In the sea and streams, only creatures with fins and scales can be eaten.

In the beginning, God instructed our first parents in the Garden of Eden to eat a plant-based, fat-free diet Then God said, "I give you every seed-bearing plant on the face of the whole earth and every tree that has fruit with seed in it. They will be yours for food" (Genesis 1:29, NIV). Consuming the flesh of animals came later, after the flood destroyed the vegetation on the earth (Genesis 9:9, 11). When humanity deviates from God's original plan for our diet and instead consume refined and processed foods with meats, diseases like diabetes results. Let us strive to get back to God's intended diet and believe, "I can do all things through Christ who strengthens me" (Philippians 4:13, NKJV).

Implications for Future Studies

Future studies should investigate the impact of individual education, length of education sessions, good communication and rapport with patients in regard to achieving patient centered goals since those factors emerged to be the pillars in achieving expected results in this project. It would be interesting also to find out the kind of impact that education intervention will have if the same education session were done but in a group session instead of it being done on individual patients as was the case in this project. The questionnaire tool used could also be applied to other studies with other races or in other communities or settings and the results be compared. This project utilized three educational sessions per individual and future studies could compare and contrast the effect of single education session in a class of many patients with DMT2.

Conflict of Interest

There was no conflict of interest in this study.

Summary and Conclusion

WHO Fact Sheet (January 2015), reported that there are four main types of NCDs that account for 82% of all deaths. These four are cardiovascular disease, cancer, respiratory disease, and diabetes. DMT2 is one of the major NCDs that has risen sharply since 1990. It is projected to increase by 65% between 2010-2035, affecting 53.1 million people in America (Rowley & Bezold, 2012). DMT2 worsens when the diabetic does not adhere to recommendations on diet and exercise (Alonso-Moran, Satylganova, Orueta, & Nuno-Solinis, 2014). Ball et al. (2012) noted that patients with DMT2 are not receiving

the essential nutritional education that is needed for the patient to manage the disease effectively and prevent complications and this project demonstrated similar findings.

Structured education on diet for DMT2 can be integrated during visits to make care compressive among the patients who have DMT2. Pre-test results indicated a need for diet education and the experimental group was given an education intervention. The end results of education intervention in this study demonstrated a reduced BMI by 1% and lower HbA1c by 1.12% among patients in the experimental group. The ADA (2017b) reports that for every 1% drop in HbA1C, there is a 40% decline in the risk of developing complications from diabetes. As a result of this project, structured diet guidelines will be provided for a *Low-fat diabetes* plate diet for all DMT2 patients who visit the BHHC for routine care. It is expected that by following evidenced-based practice guidelines and implementing them into primary care practice routines and services, that patient outcomes in DMT2 management could be improved.

APPENDIX A

APPROVAL FOR THE RESEARCH

Andrews University
Office of Research & Creative Scholarship

April 11, 2018

Ednah Makori
Tel. 269-870-4228
Email: ednah@andrews.edu

RE: APPLICATION FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS
IRB Protocol #:17-118 **Application Type:** Original **Dept.:** Nursing (DNP)
Review Category: Exempt **Action Taken**: Approved **Advisor:** Susan Allen
Title: The hemoglobin A1c of African-Americans with Type two Diabetes Mellitus using a Low-fat diabetes Plate Method

Your IRB **modification** application for approval of research involving human subjects entitled: *"The hemoglobin A1c of African-Americans with Type two Diabetes Mellitus using a Low-fat diabetes Plate Method"* IRB protocol # 17-118 has been evaluated and determined Exempt from IRB review under regulation 46.101 (b) (2). You may now proceed with your research.

Please note that any future changes (see IRB Handbook pages 11-12) made to the study design and/or informed consent form require prior approval from the IRB before such changes can be implemented. Incase you need to make changes please use the attached report form.

While there appears to be no more than minimum risks with your study, should an incidence occur that results in a research-related adverse reaction and/or physical injury, (see IRB Handbook pages 12) this must be reported immediately in writing to the IRB. Any research-related physical injury must also be reported immediately to the University Physician, Dr. Katherine, by calling (269) 473-2222.

We ask that you reference the protocol number in any future correspondence regarding this study for easy retrieval of information.

Best wishes in your research.

Sincerely,

Mordekai Ongo
Research Integrity and Complaince Officer

Institutional Review Board - 4150 Administration Dr Room 322 - Berrien Springs, MI 49104-0355
Tel: (269) 471-6361 Fax: (269) 471-6543 E-mail: irb@andrews.edu

APPENDIX B

STEPS TO CREATING A DIABETES PLATE

Step to Creating a Food Selection Plate

There are simple steps that have been suggested by ADA (2017) and have been proven for effective management of diabetes. One can still choose food they want to eat, but it gives guidance to change the portion sizes so that patient with DMT2 get larger portions of non-starchy vegetables and a smaller portion of starchy foods (1/4 of plate) and proteins (1/4 of plate).

<u>Seven steps to creating your plate:</u>

1. Using your own dinner plate, draw a line down the middle of the plate. The one side of the plate will then be cut again in order to make three sections on your plate.
2. Fill the largest section with non-starchy vegetables (examples are from list provided).
3. With two small sections remaining, fill one of the small sections with whole grains and starchy foods.
4. Fill the other small section with your protein lean proteins or plant proteins.
5. One has an option of adding a serving of fruit or non-fat dairy.
6. When cooking, it is best to use small amount of oils and for salads, it is advisable to add nuts, seeds avocado and vinaigrettes.
7. To make meals complete, water, unsweetened tea or coffee can be added.

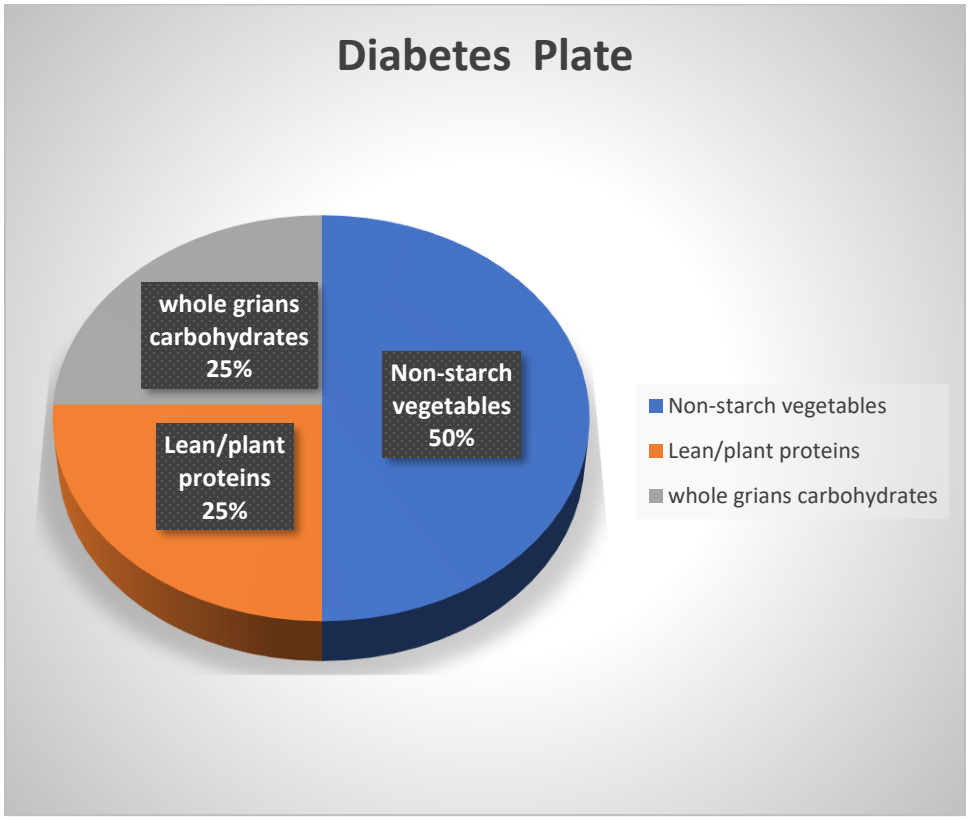


Figure for Diabetes plate.

APPENDIX C

FOOD SELECTION OPTIONS

Food Selection Options

Non-starchy vegetables

Non- starch vegetables should consist half of the plate that a diabetes patient serves.

Common **non-starchy vegetables** include; Chinese spinach, Asparagus, Baby corn, Beans (green, wax, Italian), Bean sprouts, Beets, Brussels sprouts, Broccoli, Cabbage, Carrots, Cauliflower, Celery, Coleslaw (packaged, no dressing), Cucumber, Eggplant, Greens (collard, kale, mustard, turnip), Leeks, Mushrooms, Okra, Onions, Pea pods, Peppers, Radishes, Salad greens (lettuce, romaine, spinach, watercress), Sprouts, Squash (summer, crookneck, spaghetti, zucchini), Sugar snap peas, Swiss chard, Tomato, Turnips, Water chestnuts, Yard-long beans among others.

Whole grains.

Whole grains should be in a ¼ of the plate of a patient with diabetes.

Whole grain wheat products include 100% whole wheat bread, pasta, tortillas, and crackers. Other are: Bulgur (cracked wheat), Whole wheat flour, Whole oats/oatmeal, Whole grain corn/corn meal, Popcorn, Brown rice, Whole rye, Whole grain barley, Wild rice, Buckwheat, Buckwheat flour, Millet, Quinoa, Sorghum

Starchy vegetables

Starchy vegetables are great sources of vitamins, minerals and fiber. The following are examples of **starchy vegetables** that raise blood sugar and should be discouraged. Potato, Pumpkin, Acorn squash, Butternut squash, Green Peas, Corn, Plantain.

Proteins.

Proteins should occupy ¼ of the plate of a patient with diabetes.

Plant-Based proteins.

Plant-based protein foods provide quality protein, healthy fats, and fiber. They are a great source of protein and are loaded with fiber, vitamins and minerals.

- Beans such as black, kidney, and pinto
- Bean products like baked beans and refried beans
- Lentils such as brown, green, or yellow
- Peas such as black-eyed or split peas.
- Soy nuts
- Nuts and spreads like almond butter, cashew butter, or peanut butter
- Tempeh, tofu

- Products like meatless "chicken" nuggets, "beef" crumbles, "burgers", "bacon", "sausage", and "hot dogs"

Fish and Seafood proteins.

- Fish high in omega-3 fatty acids like Albacore tuna, herring, mackerel, rainbow trout, sardines, and salmon
- Other fish including catfish, cod, flounder, haddock, halibut, orange roughy, and tilapia
- Shellfish including clams, crab, imitation shellfish, lobster, scallops, shrimp, oysters.

Poultry proteins.

Choose poultry without the skin for less saturated fat and cholesterol.

- Chicken, turkey, Cornish hen

Cheese and Eggs

- Reduced-fat cheese or regular cheese in small amounts
- Cottage cheese
- Whole eggs

Beef, Pork, Veal, Lamb

It is best to limit your intake of red meat, which is often higher in saturated fat and processed meats like ham, bacon and hot dogs, which are often higher in saturated fat and sodium. If you decide to have these, choose the leanest options, which are:

- Select or Choice grades of beef trimmed of fat including chuck, rib, rump roast, round, sirloin, cubed, flank, porterhouse, T-bone steak, tenderloin
- Lamb: chop, leg, or roast
- Veal: loin chop or roast
- Pork: Canadian bacon, center loin chop, ham, tenderloin (ADA 2017).

APPENDIX D

LOWER-FAT DIET GUIDELINES

Lower-fat Diet Guidelines

Factor 1- Substituting specially manufactured low-fat foods.

Drink 1% or skim milk

Eat low-fat cheese

Eat non-fat ice cream, frozen yogurt or sherbet

Use low-calorie (diet) salad dressings

Use non-stick spray to sauté or fry foods

Use low-fat/non-fat mayonnaise

Use less fat in baked items

Factor 2-Modify meat.

Take skin off chicken

Trim visible fat from red meat

Eat extra lean ground meat

Trim fat from meat before cooking

Factor 3-Avoid frying food.

Avoid fried fish

Avoid fried chicken

Avoid fried vegetables

Avoid fried potatoes, e.g. French fries/hash browns

Factor 4-Replace high-fat foods with low-fat foods such a as fruits and vegetables.

Replace with fruits and vegetables

Eat fruit for dessert

Eat fruit for snacks

Eat vegetables for snacks

Factor 5-Avoid fat as a spread or flavoring

Avoid fat as flavoring.

Use meatless tomato sauce on spaghetti/noodles

Eat bread/rolls without butter or margarine

Eat vegetables with butter, margarine or salt pork

Eat potatoes without butter, margarine or sour cream

Eat salads with no dressing

APPENDIX E

FAT-RELATED DIET HABITS GUIDELINES FOR BHHC

Fat-Related Diet Habits Guidelines for BHHC

Select one of the following :1=usually, 2=often, 3=sometimes, 4=rarely or never)

How often did you...

Eat broiled, baked, or poached fish?

Eat broiled or baked chicken?
Take the skin off chicken?
Eat pasta or noodles without meat?

Eat whole-wheat pasta or noodles?

Trim visible fat from red meat?

Eat extra-lean ground meat?

Eat bread, rolls, or crackers without butter or margarine?

Eat whole grain types of bread, rolls, or crackers?

Eat high-fiber cereal or add dried fruit?

Add bran or some type of fiber to cereal?

Use low-fat or nonfat milk?

Eat specially made low-fat cheese?

Eat low-fat or nonfat frozen dessert?

Add butter, margarine, or other fat to cooked vegetables?

Eat fried vegetables?

Eat fried potatoes?

Add butter, margarine, or sour cream to potatoes?

Eat brown rice?

Eat salads without dressing?

Eat salads with low-fat or nonfat dressing?

Eat no meat, fish, eggs, or cheese at dinner?

Eat two or more vegetables at dinner?

Eat one or more vegetables at lunch?

Eat fresh fruit at breakfast?

Eat cereal or oats at breakfast?

Add cream or whipped cream to dessert?

Eat only fruit for dessert?

Eat raw vegetables as a snack?

Eat fresh fruit as a snack?

Use olive oil when frying?

Trim visible fat from red meat before cooking?

Eat low-fat or nonfat mayonnaise?

Use less fat when baking cookies or cakes?

Note: the higher the score, the higher the fat-content of the diet.

APPENDIX F

DEMOGRAPHIC DATA COLLECTION TOOL

Demographic Data Collection Tool.

Demographics.

1.Gender

Male (1)

Female (2)

2.Age

18-29 years (1)

30-44years (2)

45- 59years (3)

>60 years (4).

*3.*BMI (kg/m2).

4.Education.

No formal education (1)

Primary Level (2).

Secondary Level (3).

University Level (4).

5. Working.

Yes (1).

No (2).

6. Housing.

Own a house (1).

Renting (2)

7.Diabetes duration -*in Years.*

8. Anti-diabetes therapy.

Exclusive Insulin therapy (1).

Insulin Combined with Oral hypoglycemic agents (2).

Oral Hypoglycemic agents only (3).

9. HbA1c value-*in percentage %.*

10. Have knowledge of *Diabetes Plate Method.*

Yes (1)

No (2)

APPENDIX G

FAT-RELATED DIET HABITS QUESTIONNAIRE

Fat-Related Diet Habits Questionnaire
I. Interviewer Administered Format

Please consider your food choices over the past MONTH
In the past month…

			Usually	Often	Some-times	Rarely or Never	REF
1.	Did you eat chicken?						
	1 YES →	When you ate chicken					
	2 NO	1a. How often was it fried?					
	3 NA/REF	(READ 1 – 4)	1	2	3	4	ref
		1b. How often did you remove the skin?					
		(READ 1 – 4)	1	2	3	4	ref
2.	Did you eat red meat such as beef, pork or lamb?						
	1 YES →	When you ate red meat					
	2 NO	2a. How often did you trim all					
	3 NA/REF	the visible fat? (READ RESPONSES IF NECESSARY)	1	2	3	4	ref
3.	Did you eat ground meat?						
	1 YES →	When you ate ground meat					
	2 NO	3a. How often was it extra lean?	1	2	3	4	ref
	3 NA/REF						
4.	Did you eat fish?						
	1 YES →	When you ate fish					
	2 NO	4a. How often was it fried?	1	2	3	4	ref
	3 NA/REF						
5.	Did you have at least one vegetarian dinner or main meal – that is, without meat, fish, eggs or cheese?						
	1 YES →	5a. How often did you have a					
	2 NO	vegetarian dinner?	1	2	3	4	ref
	3 NA/REF						
6.	Did you eat spaghetti or noodles?						
	1 YES →	When you ate spaghetti or noodles					
	2 NO	6a. Were they plain, or with a red					
	3 NA/REF	or tomato sauce without meat?	1	2	3	4	ref
7.	Did you eat cooked vegetables?						
	1 YES →	When you ate cooked vegetables					
	2 NO	7a. How often did you add butter,					
	3 NA/REF	margarine or other fat?	1	2	3	4	ref
		7b. How often were they fried?	1	2	3	4	ref

In the past month…

			Usually	Often	Some-times	Rarely or Never	REF
8.	Did you eat potatoes? 1 YES → When you ate potatoes 2 NO 8a. How often were they fried, like 3 NA/REF French fries or hash browns?		1	2	3	4	ref
9.	Did you eat baked or boiled potatoes? 1 YES → When you ate baked or boiled 2 NO potatoes 3 NA/REF 9a. How often did you eat them without any butter, margarine or sour cream?		1	2	3	4	ref
10.	Did you eat green salads? 1 YES → When you ate green salads 2 NO 10a. How often did you use no 3 NA/REF dressing?		1	2	3	4	ref
	10b. How often did you use low-fat or non-fat dressing?		1	2	3	4	ref
11.	Did you eat bread, rolls or muffins? 1 YES → When you ate bread, rolls or muffins 2 NO 11a. How often did you eat them 3 NA/REF without butter or margarine?		1	2	3	4	ref
12.	Did you drink milk or use milk on cereal? 1 YES → When you had milk 2 NO 12a. How often was it 1% or nonfat 3 NA/REF milk?		1	2	3	4	ref
13.	Did you eat cheese, including on sandwiches or in cooking? 1 YES → When you ate cheese 2 NO 13a. How often was it specially-made 3 NA/REF low-fat cheese??		1	2	3	4	ref
14.	Did you eat dessert? 1 YES → When you ate dessert 2 NO 14a. How often did you eat only 3 NA/REF fruit?		1	2	3	4	ref

In the past month…

		Usually	Often	Some-times	Rarely or Never	REF
15.	Did you eat home-baked cookies, cakes or pies? 1 YES → When you ate home-baked cookies, cakes or pies 2 NO 3 NA/REF 15a. How often were they made with less butter, margarine or oil than the recipe called for?	1	2	3	4	ref
16.	Did you eat frozen desserts like ice cream or sherbet? 1 YES → When you ate frozen desserts 2 NO 3 NA/REF 16a. How often did you choose frozen yogurt, sherbet or low-fat or non-fat ice cream?	1	2	3	4	ref
17.	Did you eat snacks between meals? 1 YES → When you ate snacks between meals 2 NO 3 NA/REF 17a. How often did you eat raw vegetables or fresh fruit?	1	2	3	4	ref
18.	Did you sauté or pan fry any foods? 1 YES → When you sautéed or pan fried foods 2 NO 3 NA/REF 18a. How often did you use Pam® or other non-stick spray instead of oil, margarine or butter?	1	2	3	4	ref
19.	Did you use mayonnaise or mayonnaise-type spread? 1 YES → When you used mayonnaise or mayonnaise type spread 2 NO 3 NA/REF 19a. How often did you choose low-fat or nonfat types?	1	2	3	4	ref
20.	Did you eat breakfast? 1 YES → When you ate breakfast 2 NO 3 NA/REF 20a. How often did you have fresh fruit?	1	2	3	4	ref
21.	Did you eat lunch? 1 YES → When you ate lunch 2 NO 3 NA/REF 21a. How often did you have one or more vegetables, not including potatoes or salad?	1	2	3	4	ref
22.	At dinner (or your main meal), how often did you have two or more vegetables, not including potatoes or salad?	1	2	3	4	ref

Food Habits.
During breakfast, lunch, supper or snacking:

23.What percentage of your diet consists of proteins like beans or meat?

(1) 90% or more, (2) 75 %, (3) 50%, (4)25 % or less.

24. What percentage of your diet consists of non-starch vegetables like spinach?

(1) 90% or more, (2) 75 %, (3) 50%, (4) 25 % or less.

25. What percentage of your diet consists of carbohydrates whole grains?

(1) 90% or more, (2) 75 %, (3) 50%, (4)25 % or less.

Fat-Related Diet Habits Questionnaire Eating Pattern Scoresheet

	Question	Response	
Factor 1 (substitution)			
	10_b	____	
	12_a	____	
	13_a	____	
	15_a	____	
	16_a	____	
	18_a	____	
	19_a	____	
	TOTAL	_____	÷ number answered = Factor 1 score ____
Factor 2 (Modify meat)			
	1_b	____	
	2_a	____	
	3_a	____	
	TOTAL	_____	÷ number answered = Factor 2 score ____
Factor 3 (Avoid frying)			
	1_a*	____	
	4_a*	____	
	7_b*	____	
	8_a*	____	
	TOTAL	_____	÷ number answered = Factor 3 score ____
Factor 4 (Replacement)			
	5_a	____	
	14_a	____	
	17_a	____	
	TOTAL	_____	÷ number answered = Factor 4 score ____
Factor 5 (Avoid fat)			
	6_a	____	
	7_a*	____	
	9_a	____	
	10_a	____	
	11_a	____	
	TOTAL	_____	÷ number answered = Factor 5 score ____
Summary score	$\frac{\Sigma \text{ Factors}}{5}$	= _____	

*Reverse order scoring, done as follows: 1=4, 2=3 , 3=2, 4=1. For example, a recorded score of 1 will be noted as a 4 on this score sheet, a 2 will be score 3, etc. Items 14, 17, 20, 21 and 22 are used for vegetable-related dietary patterns. [*Satia, JA, et al, Nutrition, 18: 247-54, 2002]*

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APPENDIX H

DNP ESSENTIALS SUMMARY

Essentials of nursing.

This project was designed to bring about the change that was learnt in class and from other readings, to the real life of the patients with diabetes type two at the Benton Harbor health Center (BHHC). The roles of Advanced nursing practice is broadly defined by AACN (2004) as: any form of nursing intervention that influences health care outcomes for individuals or populations, including the direct care of individual patients, management of care for individuals and populations, administration of nursing and health care organizations, and the development and implementation of health policy. The doctorate in nursing degree provides the terminal academic preparation for nursing practice through 8 essentials. Five of this eight essentials were utilized in the project in order to bring about needed change in BHHC

Five Essentials utilized in this project.

Essential I. ***Scientific Underpinnings for Practice.***

Through this essential, the Doctorate degree in Nursing prepares one to integrate nursing science with knowledge and Develop and evaluate new practice approaches based on nursing theories and theories from other disciplines. Low-fat diet Diabetes plate diet was toughly research on, before its implementation at the BHHC.

2. Essential II. ***Organizational and Systems Leadership for Quality Improvement and Systems Thinking.***

Essential two prepares one to ensure ongoing improvement of health outcomes and ensuring patient safety. The diabetes diet education intervention resulted in lowered HbA1c and BMI among the experimental participants of the project.

3. Essential III: ***Clinical Scholarship and Analytical Methods for Evidence-Based Practice***.

Essential three prepares one to Use analytic methods to critically appraise existing literature and other evidence in order to determine and implement the best evidence for practice. Low-fat diet Diabetes plate diet education brought about the best patient results that have never been seen in BHHC (significantly Lowered HbA1c and BMI in a period of three months).

4. Essential V: ***Health Care Policy for Advocacy in Health Care.***

Essential five prepares the Advanced Nurse Practitioner graduate to design; implement and advocate for health care policy that addresses issues of social justice and equity in health care. The diet education was free of charge and it was meant for the experimental group during the project. After project completion, the free diet education will continue to be accessible and available to all those who have diabetes mellitus type two at the Benton harbor health center.

5. Essential VIII: ***Advanced Nursing Practice.***

The students who graduate with a doctorate degree in nursing Practice are prepared, through essential eight to Design, implement, Educate and guide individuals and groups through complex health and situational transitions. Diabetes Diet guidelines were designed implemented and will continue to be available to all individuals with diabetes type two at the BHHC.

All the above essentials work hand in hand to ensure that the Advanced Nurse practitioner has what it takes to bring the needed change in the healthcare arena.

APPENDIX I

SUMMARY OF HEALTH CENTER EVALUATION OF PROJECT

Project Intervention Evaluation.

The evaluation meeting took at Benton Harbor Health Center (BHHC) on 4/17/19 at 3:00pm for 30 minutes, where the guidelines were delivered, and a short survey filled that had three questions about the delivered guidelines. The following were the people in the meeting:

1. The medical director of BHHC- Dr. Don Tynes.
2. The clinic Nurse.
3. The Clinic Medical assistant.

Those three people are very crucial in ensuring that the guidelines are provided to every diabetes patient who visits the clinic. The clinic nurse took the initiative of ensuring that enough copies are made and available during every clinic visit. During the meeting, the following guidelines were delivered;

For the Patients use:

1. Guidelines for creating a Diabetes plate diet.
2. Fat-Related Diet Habit questionnaires.
3. Food selection available options for patients.

For medical staff use:

4. Five food lowering factors- guidelines to educate diabetes patients on how to lower the fat content of their diet.

Teaching was done on the materials delivered to the medical staff so that they understand and become comfortable to use the materials during regular clinic visits.

Survey.

Three survey questions were administered after teaching on the delivered product. The following items were asked on the survey:

1. If the information presented was accurate for diabetes diet education at BHHC.
2. If it is realistic to implement on those guidelines during clinic visits.
3. The strengths or weakness of the delivered products.

Results of the survey.

On the first survey question, all the three participants- the medical doctor, the nurse, and the medical assistant agreed that the information presented was accurate for diabetes diet education at BHHC. On the second survey item, the three participants also all agreed that that the guidelines were realistic for implementation during regular clinic visits. On the third survey item, two participants mentioned that the guidelines were simple enough for understanding and so can be explained to the patients, while the third participant mentioned that the project was good especially for BHHC.

The meeting was concluded by the clinic staff being thanked for their cooperation, their support and willingness to participate in the meeting and completion of the survey.

All other staff were also thanked for being supportive in one way or another during my project implementation at the clinic.

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