Spring 4-17-2023

Type 2 Diabetes Treatment Plan

Kylie N. Laird
University of Texas at Tyler, Klaird2@patriots.uttyler.edu

Type 2 Diabetics New Standardized Treatment Plan Benchmark Study

Kylie Laird

The University of Texas at Tyler School of Nursing

For NURS 5382: Capstone

Dr. Colleen Marzilli

April 16, 2023

Contents

Executive Summary

Diabetes affects more than 34 million Americans, with approximately 90-95 percent of them having type 2 diabetes. Diabetes is primarily managed by the patient with assistance from their healthcare team (Centers for Disease Control and Prevention, 2021). Diabetes is a costly disease that affects individuals, healthcare systems, economies, and entire societies globally. Based on the knowledge, lifestyle interventions have shown to be effective in the management of type 2 diabetes (Garcia, 2020), a more holistic approach to disease management was pursued. Garcia (2020) conducted a study in which lifestyle intervention data for treatment of diabetes was compared to pharmaceutical management of diabetes.

Diabetes is a common topic worldwide, and there is much discussion when it comes to the prevention and overall management of the disease. In a study Advika (2017) concluded that physical activity improves glycemic control and insulin action along with weight loss. It was stated that at least one-hundred-and-fifty-minute walk total weekly was recommended for best outcome. Another study mentioned that adequate levels of physical activity reduced the risk by 8- 30% for diabetes (Galaviz et al., 2018). Metformin is primarily used for the treatment of type 2 diabetes mellitus. However, metformin can cause side effects such as lactic acidosis and nephrotoxicity (Nasri & Rafieian-Kopaei, 2014). Lifestyle modifications has been proven to lower hemoglobin A1c and does not have harmful side effects. A new and more holistic type of treatment for this disease is imperative for these patients.

Type 2 Diabetics New Standardized Treatment Plan Benchmark Study

1. Rationale for the Project

The rationale for this project is finding ways for type 2 diabetics to be given a more holistic treatment approach with lifestyle modifications related to diet and exercise to treat their disease versus metformin. The question to be answered is, in type 2 diabetic patients (P) how does carb-controlled diet and 3 thirty-minute exercise sessions per week (I) compared to metformin (C) affect hemoglobin A1C (O) in three months (T)? This project is focused on identifying evidence for the effectiveness of a structured exercise intervention program for insulin resistance in T2DM (Kumar et al., 2019). According to Goldenburg (2021) in a systematic review comparing low carbohydrate diets to very low carbohydrate diets in people with type 2 diabetes, control diets compared with low carbohydrate diets, low carbohydrate diets achieved higher rates of diabetes remission. In a systematic review that studied structured exercise programs and the effect on type 2 diabetes The results show clear evidence for the effectiveness of structured exercise programs which therefore may be recommended for type 2 diabetics (Kumar et al., 2019).

2. Literature Synthesis

During a review of the literature many articles discussed diet control or exercise control lowering hemoglobin A1c in type 2 diabetics. From these articles it was found that by a patient adhering to a regimen of lifestyle changes it would decrease effects of type 2 diabetes while simultaneously helping the patient in other areas of their life such as weight loss or increased cardiac health.

In a study of a group of ninety-two Latinas; they were compared with standard care participants versus an intensive lifestyle intervention group and the ILI group demonstrated significantly greater mean weight loss than metformin and standard care participants. The ILI

group experienced a greater reduction in waist circumference than standard care and a marginal improvement in hemoglobin A1c compared with metformin and standard care (O'Brien et al., 2017).

In a randomized control trial, the potential for remission in type two diabetics was tested. A short course of intensive lifestyle and drug therapy achieves on-treatment normoglycemia and promotes sustained weight loss, lowered hemoglobin A1c, and partial or complete remission in some participants (McInnes et al,. 2017).

In a meta-analysis completed, comparing the ketogenic diet to a standard diet for type two diabetics reveal that ketogenic diet intervention has remarkable benefits on body weight and glycemic control, as well as the improvement of lipid profiles in overweight T2DM patients. Specifically, a ketogenic diet can reduce body weight, waist circumference, HbA1c, and triglycerides, and increase HDL levels (Zhou et al., 2022). The literature points to having carbohydrate-controlled diets paired with exercise weekly will lower hemoglobin A1c and potentially have a remission effect for a type 2 diabetic patient.

3. Project Stakeholders

Stakeholders for implementing this project will include a staff who are committed to motivating others to improve their health. To implement this project, the main stakeholder will be a primary care physician. This physician will oversee all operations including ordering laboratory work, prescribing metformin, assuring the health and wellness of the participants, approving the exercise plan, and overseeing the dietician's meal plan. The next stakeholder will be a registered dietician. Since the type 2 diabetes is related to carbohydrate resistance, the meal plans will be focused on low carbohydrate meals with caloric intake related to their age, BMI,

activity level, and basic metabolic rate. Another stakeholder is the exercise coach. This coach will be responsible for assuring the participant is exercising three times weekly for thirty minutes each time. This coach will also assure the control amongst participants and having similar exercise routines to avoid any outliers. This coach will host group exercise routines. Next stakeholder will include a licensed therapist, this is someone who will have weekly check ins with patients to assure they are adhering to the regimen and that mentally they are able to continue with the implementation. These stakeholders will form a strong team who can keep individuals highly motivated and assure they are making all meeting times and staying consistent.

4. Implementation

Implementing these changes will take strong efforts from many entities. Including the patient, physicians, dieticians, licensed therapists, and exercise coaches. First, it will take a family physician willing to assume the change. Changing the treatment for type two diabetes will lessen the usage of metformin from treating diabetes and using lifestyle modifications to treat and hopefully obtain remission for many patients with this disease. Using multiple entities to achieve the end goal of lowering hemoglobin A1c's to a remission level would yield a multidisciplinary approach that would additionally include support for exercise and managing socioeconomic challenges, components perceived to be missing from the existing approach to diabetes care (Berkowitz, et al., 2018). To assure participants will be staying on track with all lifestyle interventions there will be multiple checkpoints throughout the change. The participants will also be meeting weekly with the physician, dietician, therapist, and exercise coach to alter any treatment plan. All food plans will be low carbohydrate using a macronutrient count and calorie count based on the patients age, BMI, and a moderate activity level since the patient will

be exercising three times weekly. The exercise coach will hold a class everyday where all participants are able to attend a class three times weekly. The dietician will formulate a meal plan based on the patients' preferences and food allergies and tailor it to the patient.

To sustain this change moving forward assuring the patients continue the healthy lifestyle modifications there will continue to be exercise classes offered as well as a dietician weekly that insurance will cover for a type 2 diabetic patient. Using the multidisciplinary approach to the disease will sustain the change for years to come. Lifestyle modifications will become the new normal for the way type 2 diabetics are treated rather than utilizing metformin.

5. Timetable/Flowchart

This plan includes multiple steps for type 2 diabetics in this study. The plan will begin with patients getting bloodwork drawn for their hemoglobin A1c, initiating a treatment plan, having a control group that only takes metformin, then repeating lab work at the 3-month mark. This plan includes two groups. One is a metformin only group which is the control group, and one is a lifestyle modification group. Metformin is a very common and standard practice for many type 2 diabetics which is why the study uses it as a control group. There will be a registered dietician for the diet portion of the study, an exercise specialist for the three thirty-minute exercise sessions, a therapist who can also provide mental support to the patient, and a physician to assure health clearance for the lifestyle modification group. The physician will also assure participants are adhering to their plans. After three months another hemoglobin A1c level will be drawn. Results will then be reviewed to see if lifestyle modifications or metformin decreased hemoglobin A1c levels.

The flowchart will follow these steps: recruit 50 type two diabetics greater than 18 years of age, randomly place patients by drawing names for the metformin group or the lifestyle

modifications group, have the metformin group meet with the physician to assure proper dosing and prescriptions are up to date for ninety days, metformin group will then go to the laboratory for drawing of hemoglobin A1c, the lifestyle group will meet with physician for physical exam and clearance for diet and carbohydrate-controlled diet, lifestyle modification group meets with a dietician to go on a carbohydrate-controlled diet and formulate a daily meal plan with food the patients enjoy that are within a certain amount of calories, grams of proteins, fats, and lower carbs based on age, gender, and weight that follows the recommended daily amount by the American Diet Association, lifestyle group meets with exercise trainer for an initial assessment of mobility, current injuries, and limitations, day 1 begins with exercise, nutrition plan, and metformin dose #1; exercise for 30 minutes three times weekly, one month check in with nutritionist and physician to assess progress of adhering to plan given to patient, feedback on their consistency is documented, two month check in for feedback and documentation of consistency, and finally recheck all participants hemoglobin A1c, review results and reassess for patients' further treatment.

6. Data Collection Methods

Data collection will be completed multiple times throughout the implementation. In the beginning, a baseline hemoglobin A1c will be obtained via venous blood draw. Also, throughout implementation will be multiple check points for the participants to assure they are adhering to the plan regarding diet, nutrition, and appointments with the physician. The check ins with the physician, nutritionist, and exercise coach will allow participants to be more integrated with their care. According to Berkowitz et al. (2018), most participants believed that coordinated multidisciplinary diabetes team care was a good approach, feeling that diabetes was too complicated for any one care team member to manage. For the metformin group, a check point to

assure they have been taking the medication as prescribed. This data will be collected via evaluation tool (see Appendix A) at the end of each month. Utilizing this evaluation tool will allow the stakeholders to assess the progression of the participants monthly.

7. Costs/benefits

For a ninety-day supply of metformin the price is approximately twenty-one dollars. ("Metformin prices," n.d.). In medication alone the price comes out to about eighty dollars annually, however, according to the CDC, the majority of expenses are related to hospitalizations and medications used to treat complications of diabetes (Centers for Disease Control and Prevention, 2021). People diagnosed with diabetes incur on average $16,750 annually in medical expenses. According to Ossian (2023), it costs about twenty to sixty dollars monthly for a gym membership or about $240 to $720 annually. By eating healthy choices at home versus eating out at fast food you are going to make healthier choices rather than eating increased sugar, sodium, and high fat foods at restaurants. The financial benefit of treating and potentially curing type two diabetes and negate hospitalizations from having a lowered hemoglobin A1c via lifestyle modifications a patient is saving about $16,110 annually.

For this experiment the physician conducting the orders and experiment will be from an outpatient setting that is already receiving an annual salary unrelated to this project implementation. The nutritionist will need to be paid for their time for an hourly rate of $60 an hour. The nutritionist will be expected to work for twenty hours weekly or 240 hours throughout a three-month period. The exercise coach will also be required to work 240 hours throughout a three-month period and will receive $60 an hour. This will equal to $28,800 for salary for the nutritionist and exercise coach. For the laboratory draws and obtaining the hemoglobin A1c's will costs about $85 for one patient without insurance (Bianchini, 2022). This will need to be

done two times for fifty patients will equal $8,500. For the experiment in total will cost $37,300. However, according to the CDC in 2017, the total cost of medical care and lost productivity for people with diagnosed diabetes was $327 billion. Treating type 2 diabetes with lifestyle modifications as opposed to having consistent hospitalizations from complications of the disease using the current treatment with metformin will save a substantial amount of money annually at the national level.

8. Overall Discussion and Results

There are no results of this benchmark study currently due to inability to initiate the change. However, lifestyle changes are imperative to decreasing hemoglobin A1c in type two diabetes. The goal for lowering A1c is placing a patient's type 2 diabetes into remission. Without lifestyle modification metformin is not known to lower hemoglobin A1c to a remission level. Low carbohydrate diet with three thirty-minute exercise sessions weekly will help lower hemoglobin A1c levels.

10. Recommendations

The recommendation for treatment of type 2 diabetes is to utilize lifestyle modifications with care being given from a multidisciplinary team including but not limited to a primary care physician, registered dietician, exercise coach, and therapist. Checking hemoglobin A1c's every three months to assess progress toward remission of type two diabetes will be a necessity. Utilizing metformin can lower hemoglobin A1c however, lifestyle modifications have been shown to have a greater reduction rate than metformin in many studies.

Conclusion

In conclusion, type two diabetes treatment requires a multidisciplinary team to reduce hemoglobin A1c in patients. This will require intensive lifestyle modifications including three

thirty minutes exercises weekly and a low carbohydrate diet. The way in which type 2 diabetes is currently being treated is by utilizing metformin which has been known to have dangerous side effects potentially harmful to patient's kidneys and can cause lactic acidosis. To negate the effects of a medication known to treat type two diabetes, attempting to achieve remission of type 2 diabetes is the goal with the lifestyle modifications and multidisciplinary teams. Moving forward frontline treatment for pre-diabetes and type 2 diabetes is lifestyle modification.

References

Advika, T. S., Idiculla, K., Kumari, S.J. (2017). Exercise in patients with Type 2 diabetes: Facilitators and barriers – A qualitative study. *Journal of Family Medicine and Primary Care.*

Berkowitz, S. A., Eisenstat, S. A., Barnard, L. S., & Wexler, D. J. (2018). Multidisciplinary coordinated care for Type 2 diabetes: A Qualitative Analysis of Patient Perspectives.

Bianchini, T. (2022, August 23). *How much does an A1C test cost without insurance in 2021?* Mira. Retrieved April 11, 2023, from https://www.talktomira.com/post/how-much-does-an-a1c-test-cost-without-insurance-in-2021-1

Centers for Disease Control and Prevention, (2021, August 10). *Education and Support.* Retrieved November 6, 2021.

Galaviz, K. I., Narayan, K., Lobelo, F., & Weber, M. B. (2015). Lifestyle and the prevention of type 2 diabetes: A status report. *American Journal of Lifestyle Medicine*, 12(1), 4–20.

Goldenburg, (2021). Efficacy and Safety of Low and Very Low Carbohydrate Diets for Type 2 Diabetes Remission: Systematic Review and Meta-analysis of Published and Unpublished Randomized Trial Data.

McInnes, N., Smith, A., Otto, R., Vandermey, J., Punthakee, Z., Sherifali, D., Balasubramanian, K., Hall, S., & Gerstein, H. C. (2017). Piloting a Remission Strategy in Type 2 Diabetes: Results of a Randomized Controlled Trial. *Journal of Clinical Endocrinology & Metabolism*, N.PAG.

Metformin prices, coupons, Copay & Patient Assistance. Drugs.com. (n.d.). Retrieved April 11, 2023, from https://www.drugs.com/price-guide/metformin

Nasri, H., & Rafieian-Kopaei, M. (2014). Metformin: Current knowledge. *Journal of research in medical sciences : the official journal of Isfahan University of Medical Sciences*, *19*(7), 658–664

O'Brien, M. J., Perez, A., Scanlan, A. B., Alow, V. A., Whitaker, R. C., Foster, G. D., Ackermann, R. T., Ciolino, J. D., & Homko, C. (2017) PREVENT-DM Comparative Effectiveness Trial of Lifestyle Intervention and Metformin. *American journal of preventive medicine.*

Ossian. (2023, January 19). *How much is a gym membership in 2023?* ReliaBills. Retrieved April 11, 2023, from https://www.reliabills.com/blog/how-much-is-a-gym-membership/

Sampath Kumar, A., Maiya, A. G., Shastry, B. A., Vaishali, K., Ravishankar, N., Hazari, A., Gundmi, S., & Jadhav, R. (2019). Exercise and insulin resistance in type 2 diabetes mellitus: A systematic review and meta-analysis. Annals of physical and rehabilitation medicine, 62(2), 98–103.

Zhou, C., Wang, M., Liang, J., He, G., & Chen, N. (2022). Ketogenic Diet Benefits to Weight Loss, Glycemic Control, and Lipid Profiles in Overweight Patients with Type 2 Diabetes Mellitus: A Meta-Analysis of Randomized Controlled Trails. *International journal of environmental research and public health*.

Appendix A

Evaluation Tool
1=strongly disagree 2=disagree 3=unknown 4=agree 5=strongly agree

I feel overall healthier and have more energy	1	2	3	4	5
I was able to adhere to the nutrition plan for all 3 months daily	1	2	3	4	5
I showed up to for my exercise appointments for all 3 months	1	2	3	4	5
I found the instructions for workouts to be very clear	1	2	3	4	5
I found the menu of food easy to adhere to and still was able to enjoy my meals	1	2	3	4	5
The nutritionist, physician, and exercise staff were very easy to work with and very kind	1	2	3	4	5
I plan on continuing this treatment plan and will stick to the lifestyle change	1	2	3	4	5
How many times did you deviate from the meal plan?	1-10				
How many times did you skip a workout and attend less than 3 times weekly?	1-10				