Diabetes Prevention Through Lifestyle Changes in African Americans

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Kellogg Honors College Capstone Project

Introduction

Type 2 Diabetes is a complex metabolic disorder in which the body does not produce enough insulin, or cells do not respond properly to insulin, resulting in chronic hyperglycemia. Individuals with prediabetes are those with higher-than-normal blood sugar levels, but whose levels are not high enough to be classified as diabetic. These individuals are at an increased risk of developing type 2 diabetes, especially if lifestyle changes are not put into place. Having diabetes increases an individual's risk of health conditions including heart attack, stroke, kidney disease, and vision loss. In the United States, approximately 26.9 million adults have type 2 diabetes, and 88 million adults are prediabetic[1]. Additionally, ~$327 billion is spent on diabetes-related medical costs annually in the United States[1]. The National Diabetes Prevention Program (DPP) was a large, multicenter clinical research study that showed that lifestyle intervention reduced the incidence of diabetes in those in the prediabetic stage[1]. The study showed that a 5-7% decrease in body weight, through calorie reduction and incorporation of at least 150 minutes of physical activity each week, delayed the onset of type 2 diabetes by 58% in high-risk adults[2]. Moreover, lifestyle intervention was more effective at delaying the onset of type 2 diabetes than the anti-diabetic drug metformin, which delayed the onset of type 2 diabetes by 31%[2]. The objective of the current study was to determine the effectiveness of the DPP in African Americans who are going through one of the CDC-recognized programs in their community.

Methods

Five community members at risk of developing type II diabetes and who self-identified as Black/Africa American participated in the study. Participants attended a 12-month long, CDC-recognized diabetes prevention program that was conducted via telehealth due to the COVID-19 pandemic.

Participants met with the certified lifestyle coach weekly or biweekly for the first 6 months, then monthly thereafter. Materials, including a digital scale, automatic blood pressure machine, measuring tape, and A1Cnow monitor were provided to the participants to facilitate remote, contact-free data collection.

Each meeting covered one topic related to diabetes prevention, such as healthy eating, finding time for exercise, and managing stress. Body weight was collected at each session.

The percentage of glycated hemoglobin (HbA1C), body mass index (BMI; body mass divided by the square of the body height), blood pressure, and hip-to-waist circumference were taken at the beginning of the program, at 6 months, and 12 month. Data are represented by mean ± standard error of the mean.

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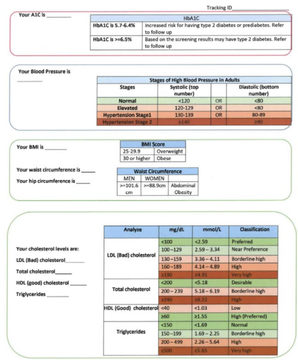

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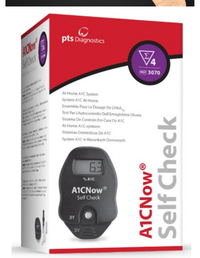

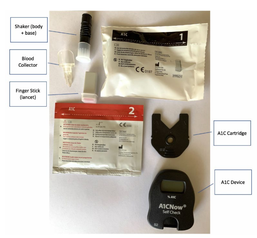

Figure 1. Example of educational content provided during the DPP program.

Figure 2. Materials provided to participants to participate in the program at home (A) Digital scale, (B) Automatic Blood Pressure Monitor, (C) Measuring Tape, and (D) At-home A1c monitor

Results

No significant difference in weight or BMI was documented throughout the 12-month period.

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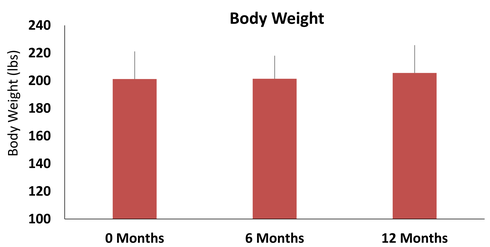

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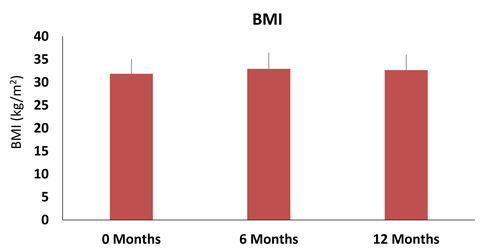


Figure 2. Body Weight and BMI During the Diabetes Prevention Program

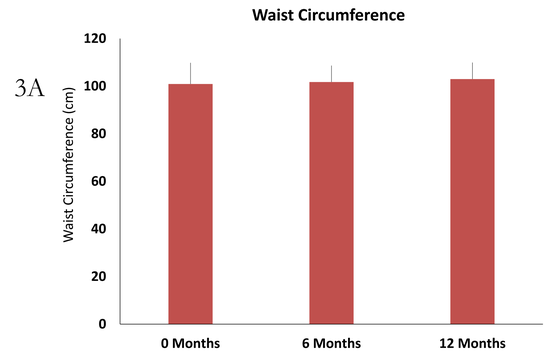
References

1. Centers for Disease Control and Prevention. "National Diabetes Statistics Report 2020. Estimates of diabetes and its burden in the United States." (2020)
2. Diabetes Prevention Program (DPP) Research Group. "The Diabetes Prevention Program (DPP): description of lifestyle intervention." *Diabetes care* vol. 25,12 (2002): 2165-71.
3. Zeigler, Zachary. "COVID-19 Self-quarantine and Weight Gain Risk Factors in Adults." *Current obesity reports* vol. 10,3 (2021): 423-433.

Results

No significant difference in waist circumference or hip circumference was documented throughout the 12-month period.
Systolic blood pressure tended to decrease within the first 6 months of the program and was significantly lower at 12 months ($P<0.05$).
Diastolic blood pressure was significantly lower after both 6- and 12-months of the DPP program.
While participants' HbA1C levels tended to decrease over time, they were still in the prediabetic range (5.7-6.4%) at 12 months.

3A



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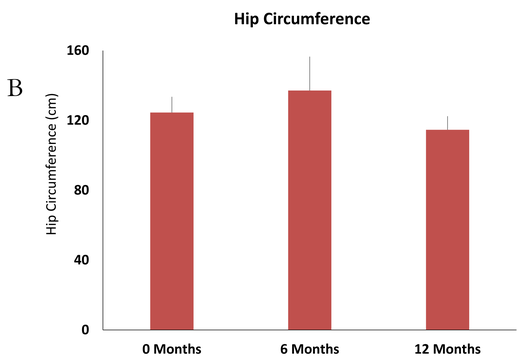

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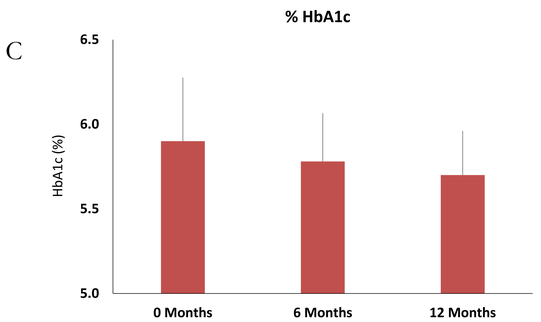

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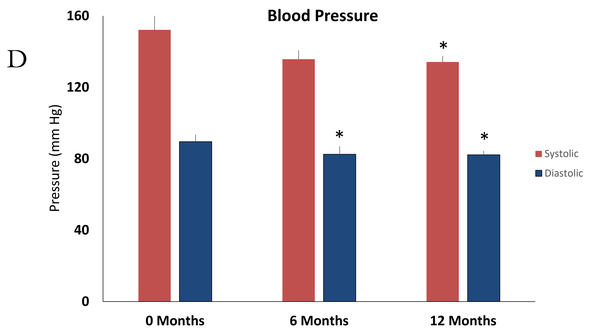

Figure 3. (A) Waist Circumference, (B) Hip Circumference, (C) HbA1c Percentage, and (D) Blood Pressure During the Diabetes Prevention Program

Conclusion

Our data show that participating in the DPP via telehealth during the Covid-19 pandemic did not reduce the risk of type 2 diabetes in African Americans. Participants did not achieve the goal of 5% loss of body mass and, although participant HbA1c level tended to decrease over the 12-month period, they did not fall below the prediabetic range.
Our results may have been influenced by the pandemic. Several studies show the pandemic increased stress levels and negative coping mechanisms, such as emotional eating[3]. In addition, lower levels of daily activity due to isolation and social distancing, as well as less access to gyms during the pandemic may have been barriers to success in the DPP program.
We speculate that participating in the DPP prevented the participants from experiencing weight gain during quarantine by increasing their awareness of risk factors like increased sedentary behaviors, decreased physical activity, increased snacking frequency, increased alcohol intake, emotional eating, decreased sleep quality [3].

Acknowledgement

I would like to thank Dr. Jellyman for being an outstanding mentor and PI. I am so thankful for the opportunity to work on this project and to have real-world experience with public health research. I would also like to thank my friends and family as well as the Kellogg Honors College for all the support and guidance I received during this project and throughout my undergraduate career.