

## Diabetes & its Complications

# Promoting Physical Activity in the Diabetic and Pre-Diabetic Low Socioeconomic Population: Case Study

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### ABSTRACT

**Introduction:** Movement and exercise play a vital role in health maintenance and preventing complications with diabetes. Type 2 diabetes can be reversed or/and managed with lifestyle modifications. The lifestyle modification of focus in this study is increasing daily steps with a goal of 10,000 a day.

**Methods:** This is a case study  $n=1$  including participants that were diagnosed with type 2 diabetes. The focus of the study is to identify any increase in activity level (steps) by giving a patient a pedometer and setting a daily step goal. The patient documented their steps in the activity log every day for 3 months. Their weight and hemoglobin A1C were measured at the beginning and end of the study. A questionnaire was completed at the beginning of the study and at the completion of the study. At the end of the study the patient completed a questionnaire of their perception of increased activity with the pedometer.

**Results:** On the posttest questionnaire, the participant said it did increase the motivation level and compliance. Having a goal did help to increase activity level. The first day steps recorded were 3,357. The daily step goal was set at 10,000 steps. It was met and exceeded 77% of the time over the 3-month period with an average daily step being 14,695.

**Conclusions:** More research needs to be conducted due to a small sample size.

### Keywords

Type 2 diabetes, Chronic disease preventions, Pedometer.

### Introduction

Movement and exercise play a vital role in health maintenance and preventing complications with diabetes. In regard to type 2 diabetic patients, type 2 diabetes can be reversed or/and managed with lifestyle modifications instead of with a medication regime. When education is the only intervention promoting behavior change, it tends to be ineffective [1]. The monitoring of community dwelling 70-year old's demonstrate a higher daily step count was associated with lower risk of diabetes [2].

According to The Center for Disease Control and Prevention [3], more than 37 million Americans have diabetes, which equates to

about 1 in 10 people. Among the 37 million Americans who suffer from diabetes, about 90-95% of them have type 2 diabetes [3]. About 90% of people with type 2 diabetes are obese or overweight [4]. As health care providers, it is our responsibility to educate on the importance of what a healthy diet consists of, the recommended exercise regime, and chronic disease prevention.

Physical activity on a regular basis can improve metabolic control, blood lipid profile, blood pressure, and quality of life [5]. Most adults with type 1 and 2 diabetes should engage in 150 min or more of moderate- to vigorous-intensity aerobic activity per week that is spread over at least 3 days/week, with no more than 2 consecutive days without activity [6]. According to the American Diabetes Association [6], physical activity and exercise should be recommended to all individuals with diabetes as part of

management of glycemia and overall health tailoring it to meet each individuals' specific needs.

Being active can make your body more sensitive to insulin and reduce the risk of cardiovascular disease. This study aims to answer the question, does using a pedometer with educational material increase exercise compliance with the diabetic patient? The focused population includes adults who are in the low socioeconomic population.

## Methods

This is a case study n=1 including participants that were diagnosed with type 2 diabetes. The study sought participants that were pre-diabetic, type 1 and type 2 diabetes at the Shoals Community Clinic. The Shoals Community Clinic serves the low income and uninsured people who often have nowhere to go to receive health care except the hospital emergency rooms. People who have a lack of financial resources are often limited from using a primary healthcare provider.

## Participants

There were five participants in the study with only one of the participants completing the program. The four participants that did not complete the program did not return for a follow up within the study time frame nor did they indicate why they no longer wanted to participate. Participant n=1 is a 48-year-old black male who has been diagnosed with type 2 diabetes. Height is 6ft 2in with a BMI of 35.6 at the beginning of the study. The study was approved through the Institutional Review Board at the University of North Alabama. The participants were explained in detail about the study and signed an informed consent. They were given a copy of the consent to take home. They were informed they could stop their participation at any time, without any penalty or loss of benefits.

## Protocol

The focus of the study is to identify any increase in activity level (steps) by giving a patient a pedometer and setting a daily step goal. Evidence supports that regular stepping is a way for older adults to prevent type 2 diabetes [7]. The participant documented daily steps in the activity log every day for 3 months. The weight and hemoglobin A1C were measured at the beginning and end of the study. Hemoglobin A1C is the metric to demonstrate the effectiveness of treatment [6]. The 3-month time period was utilized based on the hemoglobin A1C giving an average measurement of your glucose over the past 3 months. This time frame would give render a reading of what changes did or did not occur in the glucose management. Both measurements were taken in the morning. Fasting was not required. A questionnaire was completed at the beginning of the study and at the completion of the study. The participants were given a chance at winning a \$100 gift card if the study was completed. The objective of the study is to increase their steps per day and increase their motivation to exercise giving them a goal to work toward. At the end of the study the participant completed a few questions of their perception of increased activity with the pedometer.

## Statistical Analysis

The results were compared pre and post study.

## Results

The pretest questionnaire was completed revealing that he exercised 5-7 times a week. The participant did not know how many steps was achieved in an average day. On the posttest questionnaire, the participant said it did increase the motivation level and compliance. Having a goal did help to increase activity level. The participant was informed to use the first day to measure a normal day. The first day steps recorded were 3,357. The daily step goal was set at 10,000 steps. It was met and exceeded 77% of the time over the 3-month period with an average daily step being 14,695. The participants BMI decreased from 35.6 to 34.5.

Measure	Beginning of study	End of study
HA1C	6.8	6.4
Weight	277	269

## Discussion

Research in the specialty care of diabetes has revealed the possibility of reversing type 2 diabetes. Type 2 diabetes can be reversed by considerable weight loss in the early years after diagnosis [8]. Long-term maintenance of weight loss brings about lasting remission with the diabetic patients [8]. Weight loss, health promotion, and disease prevention is achieved by multiple behaviors including healthy eating, exercise, reducing stress, and getting adequate sleep.

The participant did show a weight loss of 8 pounds and BMI reduction from 35.6 to 34.5 with improvement in the HA1C level over the 3-month period. The participant said it did increase the motivation level and compliance and setting a step goal did help to increase activity level. According to the American Diabetes Association [6], physical activity and exercise should be recommended to all individuals with diabetes as part of management of glycemia and overall health tailoring it to meet each individuals' specific needs. Being active can make your body more sensitive to insulin and reduce the risk of cardiovascular disease. The results from this case study support the current recommendations.

## Conclusions

The study was ongoing for 10 months with 5 participants willing to participate. The limitations of the study were small sample size and the lack of follow through with the 4 participants during the study. More research needs to be conducted due to a small sample size. The one participant did show a weight loss and improvement in the HA1C level over the 3-month period.

## References

1. Hood KK, Hilliard M, Piatt G, et al. Effective strategies for encouraging behavior change in people with diabetes. *Diabetes management*. 2015; 5: 499-510.
2. Ballin M, Nordström P, Niklasson J, et al. Daily step count and incident diabetes in community dwelling 70 year olds a prospective cohort study. *BMC Public Health*. 2020; 20: 1830.



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## Appendix B

### Beginning Study Questionnaire

How many times do you exercise at least 30 minutes a day?

- A. None
- B. 1 day-2 days a week
- C. 2-3 days a week
- D. 3-5 days a week
- E. 5-7 days a week

Do you know how many steps you get a day?

- A. Yes
- B. No

If you answered yes to the above question record below.

## Appendix C

### End of Study Questionnaire

1. Did the resources provided with the study increase your motivation and compliance to increase your activity?

- A. Yes
- B. No

2. About how many steps did you get daily during the study?

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Please add any additional comments below.