Can Paired Testing Improve Glycemic Status in T2D Using Lifestyle Education?

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INTRODUCTION

Type 2 Diabetes accounts for 90-95% of the total population of people who are diagnosed with diabetes in the United States and is often associated with obesity, hypertension, and physical inactivity. Lifestyle measures are the first line interventions along with metformin for the treatment of type 2 diabetes. The World Health Organization suggests that self-monitoring of blood glucose should be performed in conjunction with a plan of action to adjust diet, physical activity, and medication according to the blood glucose measurement. Paired blood glucose monitoring is the process of self-monitoring of blood glucose before and after a meal or activity. The aim of this study was to find a cost-effective blood glucose monitoring regimen that can provide both the patient and clinician with real time data to use for the management of diabetes in a primary care setting.

OUTCOME MEASURES

Primary Outcomes

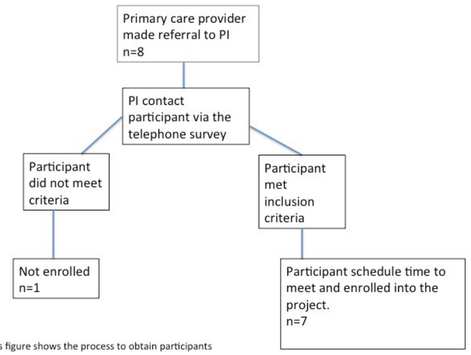
- Statistically significant reduction of HbA1c

Secondary Outcomes

- Reduction of pre/post prandial blood glucose average
- Improvement in anthropometric measurements
- Improvement in survey responses
- Improvement in laboratory data

Figure 1

Process to obtain participants



Note. This figure shows the process to obtain participants

METHODS

- This was a single center prospective study conducted August 2020 to August 2021, in Staten Island, New York in a primary care setting
- 7 participants from a convenience sample
- Referral from primary care provider (see fig 1.)
- PI screened via telephone

Inclusion Criteria

- 18years or older non pregnant adult with type 2 diabetes for at least 1 year
- HbA1c > 6.5% and taking oral medication, GLP-1, or basal insulin
- Willing and able to SMBG two times per day
- Meet with PI monthly and keep a blood glucose and dietary log

Exclusion Criteria

- Cognitive disorder
- Severe depression
- Using prandial insulin or long-term prednisone (>1month)
- Eating less than three meals per day

Visit 1

- Consent signed and presurvey administered
- Baseline data obtained (Age, Blood pressure, Height, Weight, Sex, BMI, Duration of Diabetes, Diabetes medication, Cholesterol levels, Microalbumin level, and HbA1c)
- Lifestyle education provided
- Participant demonstrated BG technique
- Educational and study materials reviewed and provided to participants

Monthly Visits

- A week prior to 2nd and 4th visit laboratory data collected
- BG and diet logs reviewed
- Lifestyle education provided

4th visit

- Post survey was administered
- Case conference with PCP and med adjustments were suggested

Month 1	Monitor blood glucose fasting and 2 hours after breakfast
Month 2	Monitor blood glucose before lunch and 2 hours after lunch
Month 3	Monitor blood glucose before dinner and 2 hours after dinner
Month 4	Monitor blood glucose fasting and 2 hours after breakfast

RESULTS

Table 1

This table displays the pre-intervention demographic data of all participants

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Age	7	26	48	74	63.14	8.840
Height	7	9	60	69	64.71	3.147
Weight	7	119	153	272	187.57	40.480
BMI	7	16.30	26.30	42.60	31.6457	6.66848
Duration	7	34	1	35	17.14	13.850
Valid N (listwise)	7					

Note. This table displays the demographic data of all participants

Table 3

This table compares pre and post breakfast glucose averages

	N	Minimum	Maximum	Mean	Std. Deviation
Prebreakfast	2	137.42	223.32	180.3700	60.74047
Prebreakfast2	2	126.42	248.24	187.3300	86.13975
Postbreakfast	2	195.07	249.84	222.4550	38.72824
Postbreakfast2	2	134.53	269.35	201.9400	95.33214
Valid N (listwise)	2				

Note. This table shows the average of the pre and post breakfast glucose comparing from Month 1 and Month 4. A number 2 after the heading denotes Month 4

Table 5

This table compares pre and post-intervention laboratory data for all of the participants

	N	Range	Minimum	Maximum	Mean	Std. Deviation
HbA1c	7	4.3	6.6	10.9	7.857	1.5480
HbA1c2	4	3.2	6.4	9.6	7.325	1.5218
TC	7	173	105	278	177.57	66.083
TC2	4	125	127	252	200.75	59.913
LDL	7	117	52	169	101.71	45.937
LDL2	4	107	72	179	128.00	48.477
HDL	7	25	34	59	44.43	10.196
HDL2	4	19	36	55	45.50	8.266
TG	7	277	48	325	175.71	109.529
TG2	4	151	84	235	135.00	68.717
Nonhdl	4	130	67	197	119.00	61.747
Nonhdl2	4	114	91	205	155.25	57.703
Albumin	7	23.10	.00	23.10	7.8286	7.88981
Albumin2	4	31.80	.00	31.80	20.7750	15.01474
Valid N (listwise)	3					

Note. TC denotes Total Cholesterol, LDL Low-density lipoprotein, HDL High-density lipoprotein, and Non-HDL Non high density lipoprotein. A 2 after denotes post-intervention laboratory test denote post laboratory

Table 6

This table displays post intervention demographic data for all participants

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Age2	7	26	48	74	63.14	8.840
Height2	7	9	60	69	64.71	3.147
Weight2	7	76	156	232	181.00	26.926
BMI2	7	14.25	25.55	39.80	30.6200	5.30649
Duraton2	7	34	1	35	17.14	13.850
Valid N (listwise)	7					

Note. A 2 after the heading denotes the post-intervention data. Weight and BMI are decreased compared to baseline data.

CONCLUSIONS

Diabetes self-management education and paired blood glucose testing may be helpful with lowering HbA1c in patients with type 2 diabetes in a primary care practice. Further projects can have shorter length of time for paired testing. For example, a regimen of paired testing a specific meal each week for a month might increase adherence to keeping a blood glucose and diet logs. Future studies can incorporate continuous glucose monitoring systems since there is easier access to electronic logbooks through the software that often accompanies these devices. Paired blood glucose testing can be an effective tool for blood glucose monitoring for a highly motivated patient.

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