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A geriatrics walking clinic improves hemoglobin A1c and timed gait in older veterans with type 2 diabetes

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Abstract

Over one quarter of older adults in the U.S. has diabetes; and, physical activity is important for the promotion of healthy aging in this population. The purpose of this clinical demonstration project is to evaluate the effect of physical activity in the form of walking on glycemic control and timed gait in older Veterans with type 2 diabetes (T2D). Veterans aged 60 years were enrolled in the Geriatrics Walking Clinic (GWC), a clinical demonstration project, at South Texas Veterans Health Care System. GWC is a ≥6-week clinical program that promotes physical activity and is delivered by a registered nurse/diabetes educator and geriatrician. Veterans were recruited from the VA clinics. Enrolled patients received a pedometer at an initial face-to-face visit, were followed with weekly phone calls to monitor steps/day, received encouragement, and participated in a final face-to-face visit at the end of 6 weeks. In a sub-set of patients with T2D, we performed a chart review and recorded Hemoglobin A1c (HbA1c) at 3, 6, and 12 months after completion of the program. Timed Gait, a major characteristic of frailty, was measured at baseline and after completing the program. Change in HbA1c and timed gait compared to baseline was examined

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All panel members contributed to the concept, design, and preparation of the manuscript.

using paired *t*-tests. Sixty-two patients had HbA1c values available and were included in this analysis. Of these, 36, 52, and 61 patients had repeat HbA1c at 3, 6, and 12 months after the intervention, respectively. Mean age was 68 ± 6 years, 58% were Hispanic, and 92% males. HbA1c improved at 3 months (−0.49, 95% CI: −0.87 to −0.12, p=0.013), at 6 months (−0.40, 95% CI: −0.68 to −0.12, p=0.006), and at 12 months (−0.30, 95% CI: −0.57 to −0.029, p=0.031) compared to baseline. Timed Gait also improved (9.3 ± 1.7 vs. 10.2 ± 1.8, p<0.001). The finding highlights that older patients with T2D ben efit from a GWC with improved glycemic control and timed gait.

Keywords

Physical activity; Type 2 diabetes; Glycemic control

Introduction

The prevalence of type 2 diabetes (T2D) increases with advancing age; approximately one quarter of adults aged 65 years or older have T2D. [1] If not managed properly with diet, activity, and pharmacotherapy, it can lead to serious complications including eye disease, renal impairment, cardiovascular and peripheral disease.[2] Further, older adults with T2D exhibit greater declines in muscle strength, functional capacity, and rapid loss of muscle mass.[2]

Global recommendations and the Centers for Disease Control suggest older adults should perform at least 150 minutes of moderate-intensity aerobic physical activity throughout the week.[3,4] Physical activity is a substantial part of the management of T2D and is first-line treatment along with diet modification.[5] Perhaps the largest study of a lifestyle intervention for Type 2 diabetes is the Action for Health in Diabetes (Look AHEAD) study. The Look AHEAD study was a randomized clinical trial of intensive lifestyle intervention compared to standard diabetes support and education in over 5000 adults with T2D and excess body weight.[6] The intensive lifestyle intervention included calorie restriction, targeted to achieve 7% weight loss, and physical activity. The intensive lifestyle intervention led to many important benefits, including improved HbA1c, less renal disease, reduced need for anti-diabetic medications, lower mobility disability, and improved quality of life.[7–9] While the Look AHEAD study did not focus solely on older adults, approximately 43% were aged 60 years or over, and the intervention was found to reduce frailty.[10] Regarding older adults with T2D specifically, several studies have demonstrated the benefits of physical activity for improving insulin sensitivity, cardio-respiratory fitness, glycemic control, and psychosocial well-being.[11] Exercise interventions have also been shown to improve muscle strength, reduce falls, improve physical fitness, and quality of life is documented on glycemic control in older adults with T2D.[12] However, in spite of the substantial evidence supporting the role of physical activity in improving glycemic control and improving function, unfortunately over 60% of older adults with T2D report that they do not meet physical activity recommendations due to mobility limitations, health conditions, or lack of motivation or resources.[13,14]

Here we describe an evaluation of a clinical demonstration/quality improvement project we implemented to encourage walking for exercise in older adults, the Geriatric Walking Clinic (GWC). This clinic also provided advice regarding following a diabetic diet. Here, we provide an evaluation to examine whether this clinical demonstration program led to improvements in glycemic control as well as timed gait in older veterans with T2D.

Methods

Patient population

The GWC is a referral clinic we initiated to deliver a 6-week walking program designed to encourage older adults to increase their physical activity through walking. Patients at the South Texas Veterans Health Care System (STVHCS) were eligible for participation if they were 60 years or older, willing to walk for exercise, and willing to accept weekly phone calls. Patients were recruited via multiple means including: (1) flyers/brochures placed in patient waiting areas within the main hospital (Audie L. Murphy Memorial VA Hospital) and Community-based Outpatient Clinics (CBOCs) within STVHCS; (2) community events and health fairs for Veterans within STVHCS; (3) an electronic kiosk placed in the Geriatric Evaluation and Management (GEM) Clinic waiting room with electronic flyers; and (4) referrals from primary care providers through a consult within the electronic medical record system, which was available to all clinical care providers at STVHCS. This was a clinical demonstration project and was approved as quality improvement/program evaluation by the Institutional Review Board at the University of Texas Health Science Center at San Antonio, which serves the STVHCS, and consent was not required.

Patient screening

Patients had an initial evaluation for safety for walking exercise based on the National Institute of Aging's (NIA) Exercise Assessment and Screening for You (EASY) criteria.[15] The NIA EASY is a six-item screening tool which includes questions regarding chest pain and tightness during physical activity, dizziness, high blood pressure, pain, stiffness and swelling of joints, falls or feeling unsteady while walking, or any other reason the patient would be concerned about starting a physical activity program. All subjects were seen and evaluated by a geriatrician who reviewed their medical history and performed an evaluation to determine appropriateness for participation in the program. Additional history was taken to screen for medical contraindications to exercise, including unstable angina, severe left main coronary artery disease, end stage congestive heart failure (ejection fraction <30%), severe aortic valvular disease, uncontrolled cardiac arrhythmia, uncontrolled hypertension (systolic >180 mmHg or diastolic >100 mmHg), large abdominal aortic aneurysm, severe shortness of breath, cognitive impairment that interferes with compliance, stroke within the prior six months, uncontrolled T2D (Hemoglobin A1c [HbA1c] >10%), and pain limiting walking.

Clinical intervention

The clinic involved an initial baseline face-to-face visit, weekly telephone follow-up calls during, and a follow-up face-to-face visit at 6-weeks. At the baseline clinic visit, patients met individually with a registered nurse (RN) (who was also a certified diabetes educator)

to screen for eligibility, perform baseline assessments, support the patient in self-setting individualized goals for the program, issue a pedometer, and train the patient on the use of the pedometer. Patients were also seen by a Geriatrician to review medical history, perform physical examination, and verify patients' safety for exercise. Patients received individualized counseling on healthy food intake along with educational materials about the benefits of walking.

During the first week of the program, patients were instructed to perform usual activities and not to change their routine, in order to establish an estimate of average step count per day at baseline. Weekly telephone calls were made by the RN to inquire about daily step counts; troubleshoot barriers to walking; offer suggestions, encouragement, and counseling; and help the patient establish a goal for an increase in daily step counts (targeting a 5–10% increase each week). Patients were provided a log to record daily step counts. Our clinic did not recommend any changes to diabetes medications and deferred any pharmacologic management of diabetes to the patients' primary care providers.

At approximately 6 weeks, patients were seen for a face-to-face visit for review of progress and re-assessment of physical measurements. In order to facilitate continued lifestyle change and walking for exercise, patients were encouraged and provided education on Veterans Administration (VA) and community resources available for continued exercise. At the follow-up visit, patients were encouraged to continue to walk and monitor using their pedometers, received an additional phone call one month later, and received a certificate of completion.

Assessments

Measurements taken at baseline and at follow-up include height, weight, BMI (BMI was measured by directly measuring height and weight), timed gait, and Timed Up and Go (TUG) test.[16] Timed gait was measured at usual pace over a 10-foot course as described.[17] Two trials were done, and the faster of the two trials was used for analysis. The TUG was performed by timing the patient rising from a chair, walking 3 meters, turning, walking back, and sitting down again.[16,17] Participants were permitted to use assistive devices for these assessments. HbA1c was ascertained via review of electronic medical record at baseline (3 months prior to enrollment) and at either 3, 6, and 12 months after completing the walking program.

Statistical analysis

Descriptive statistics were used to summarize patient characteristics. Change in BMI, steps per day, HbA1c, timed gait, and TUG measures from baseline to 6 weeks were analyzed using paired t-tests. Data were analyzed using STATA 12.0.[18]

Results

Baseline characteristics are shown in Table 1. Mean ±SD age of the patients was 67.6 ±6.0 years, majority were male (92%), and Hispanic (58%), which is consistent with our older Veteran population in South Texas. All patients had T2D, and many patients had other chronic diseases, such as hypertension (94%) and coronary artery disease (34%).

Compared to baseline there was a statistically significant improvement in BMI (−0.41 kg/m^2, 95% confidence interval [CI]: −0.80 to −0.02), p=0.040), average steps per day (+1402.5, 95% CI: 612.7 to 2192.2, p=0.0008), timed gait (−0.21 s, 95% CI: −0.32 to −0.10), p=0.0003), and TUG (−0.83 s, 95% CI: −1.14 to .0.51, p <0.0001). HbA1c also improved at all timepoints (see Table 2). Compared to baseline, there was a statistically significant improvement in HbA1c at 3 months (N=36) (−0.49, 95% CI: −0.87 to −0.12), p=0.012); at 6 months (N=52) (−0.40, 95% CI: −0.68 to −0.12, p=0.006); and at 12 months (N=61) (−0.30, 95% CI: −0.57 to −0.029, p=0.03).

For intervention fidelity, patients were provided a log to record daily step counts and the study nurse conducted weekly telephone calls to inquire about daily steps. Each week, the daily average over one week was calculated and recorded in a note in the medical chart for the program geriatrician's review and signature. There was approximately 31.8% improvement in steps per day with 4406.2 steps/day on average at baseline compared with 5808.6 steps/day at the end of the program.

Discussion

Results from our GWC, a clinical demonstration project, show that a structured program to increase physical activity in the form of walking that also included nutritional counseling resulted in significant improvement in HbA1c. We previously reported that this intervention led to improvements in timed gait, a major characteristic of frailty.[19] In this analysis, we build upon previous findings to additionally show that the intervention results in improved glycemic control in the T2D population. Notably, these improvements in timed gait and HbA1c occurred with a brief intervention and relatively small increases in step counts/day.

Prior studies have shown that physical activity improves glycemic control in T2D. A meta-analysis of 11 randomized control trials of using a step counter to encourage physical activity supported that walking, both supervised and unsupervised using motivational strategies for encouragement, significantly decreases HbA1c among T2D patients by approximately 0.5%.[20] Increased daily step count has also been associated with improved glycemic control and reduced number of T2D associated cardiometabolic risk factors in population based cohorts and outpatient clinical settings.[21–24] Even a small increase in daily steps (1000–2500) from baseline is enough to improve outcomes like body weight, glycemia, and other cardiometabolic outcomes.[21,22,25] Achieving at least 7500 steps/day has been suggested to be a salient target for older adult populations for 2-fold risk reduction.[25]

Improvements in physical activity through walking has also been related to improvement in mortality. Lee et al. (2019) in their cohort study of 16,741 women with a mean age of 72 years, reported that women who averaged approximately 4400 steps/day had significantly lower mortality compared with those who took approximately 2700 steps/day. The authors concluded that as more steps/day were accrued, mortality rates progressively decreased before leveling at approximately 7500 steps/day.[14] Similarly, in a representative sample of U.S. adults, walking 8000 and 12,000 steps per day was associated with a 51% and 65% lower risk for all-cause mortality, respectively, compared with taking 4000 steps.[26]

Our study has some limitations, including the small number of patients evaluated, a short follow-up period, predominance of male and Hispanic patients, and HbA1c was not collected by our walking clinic but rather gathered via chart review post-hoc. The walking clinic is a clinical demonstration program, not a randomized controlled trial, and therefore results may not be generalizable. Further, because the patients referred to the Geriatric Walking Clinic were either self-referred or were referred by their treating providers, we can only observe the effect of the clinical intervention in motivated individuals. Additionally, individuals with medical conditions that would limit safety with exercise were excluded. Therefore, this sample includes relatively healthy older adults. In spite of these limitations, we demonstrated significant improvement in HbA1c in our patients at follow-up. Therefore, a strength of our evaluation is that we have demonstrated the effect of promoting walking for exercise in a “real world” clinical setting. We acknowledge that dietary counseling provided as a component of this clinic intervention could have also contributed to improvements in HbA1c. Robust representation of minority participants is also a significant strength of our program.

Individualized walking programs targeting older adults may help improve glycemic control in older adults with T2D. Our findings support that encouraging walking for exercise with a goal to improve glycemic control in older adults with T2D is feasible and effective in a clinical setting. Improvement in glycemic control through walking may lead to additional benefits such as decrease in complications of diabetes and decrease in medication use for diabetes.

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References

1. Centers for Disease Control and Prevention. National diabetes statistics report. Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services; 202… Accessed 03/31/2020; https://www.cdc.gov/diabetes/data/statistics/statistics-report.html.
2. Morley JE, Malmstrom TK, Rodriguez-Manas L, Sinclair AJ. Frailty, sarcopenia and diabetes. J Am Med Dir Assoc. 2014;15(12):853–859. [PubMed: 25455530]
3. Center for Disease Control and Prevention. How much physical activity do adults need? Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services; 2019… Accessed 03/31/2020; https://www.cdc.gov/physicalactivity/basics/adults/index.htm.
4. World Health Organization. Physical activity and older adults recommended levelsof physical activity for adults aged 65 and above. 2018. Accessed 09/01/2020. https://www.who.int/dietphysicalactivity/factsheet_olderadults/en/.
5. American Diabetes Association. Obesity management for the treatment of type 2 diabetes: standards of medical care in diabetes-2019. Diabetes Care. 2019;42(Suppl 1):S81–S89. 10.2337/dc19-S008. [PubMed: 30559234]
6. Ryan DHeeeeeeeee, Espeland MA, Foster GD, et al. Look AHEAD (Action for Health in Diabetes): design and methods for a clinical trial of weight loss for the prevention of cardiovascular disease in type 2 diabetes. Control Clin Trials. 2003;24(5):610–628. [PubMed: 14500058]

7. Pi-Sunyer X The look AHEAD trial: a review and discussion of its outcomes. Curr Nutr Rep. 2014;3(4):387–391. [PubMed: 25729633]
8. Redmon JB, Bertoni AG, Connelly S, et al. Effect of the look AHEAD study intervention on medication use and related cost to treat cardiovascular disease risk factors in individuals with type 2 diabetes. Diabetes Care. 2010;33(6):1153–1158. [PubMed: 20332353]
9. Rejeski WJ, Ip EH, Bertoni AG, et al. Lifestyle change and mobility in obese adults with type 2 diabetes. New Engl J Med. 2012;366(13):1209–1217. [PubMed: 22455415]
10. Simpson FR, Pajewski NM, Nicklas B, et al. Impact of multidomain lifestyle intervention on frailty through the lens of deficit accumulation in adults with Type 2 diabetes mellitus. J Gerontol Ser A Biol Sci Med Sci. 2019.
11. Pai LW, Chang PY, Chen W, Hwu YJ, Lai CH. The effectiveness of physical leisure time activities on glycaemic control in adult patients with diabetes type 2: a systematic review. JBI Libr Syst Rev. 2012;10(42 Suppl):1–20.
12. Cadore EL, Izquierdo M. Exercise interventions in polypathological aging patients that coexist with diabetes mellitus: improving functional status and quality of life. Age (Dordr). 2015;37(3):64. [PubMed: 26054595]
13. Zhao G, Ford ES, Li C, Balluz LS. Physical activity in U.S. older adults with diabetes mellitus: prevalence and correlates of meeting physical activity recommendations. J Am Geriat Soc. 2011;59(1):132–137. [PubMed: 21226683]
14. Lee IM, Shiroma EJ, Kamada M, Bassett DR, Matthews CE, Buring JE. Association of step volume and intensity with all-cause mortality in older women. JAMA Intern Med. 2019.
15. Resnick B, Ory MG, Hora K, et al. A proposal for a new screening paradigm and tool called exercise assessment and screening for you (EASY). J Aging Phys Act. 2008;16(2):215–233. [PubMed: 18483443]
16. Podsiadlo D, Richardson S. The timed “Up & Go”: a test of basic functional mobility for frail elderly persons. J Am Geriat Soc. 1991;39(2):142–148. [PubMed: 1991946]
17. Espinoza SE, Hazuda HP. Frailty in older Mexican–American and European–American adults: is there an ethnic disparity? J Am Geriat Soc. 2008;56(9):1744–1749. [PubMed: 18662198]
18. StataCorp. Stata statistical software: release 12. College Station, TX: StataCorp LP; 2011.
19. Espinoza SE, Orsak B, Wang CP, et al. An individualized low-intensity walking clinic leads to improvement in frailty characteristics in older veterans. J Frailty Aging. 2019;8(4):205–209. [PubMed: 31637407]
20. Qiu S, Cai X, Chen X, Yang B, Sun Z. Step counter use in type 2 diabetes: a meta-analysis of randomized controlled trials. BMC Medicine. 2014;12:36. [PubMed: 24571580]
21. Dwyer T, Ponsonby AL, Ukoumunne OC, et al. Association of change in daily step count over five years with insulin sensitivity and adiposity: population based cohort study. BMJ (Clin Res Ed). 2011;342:c7249.
22. Fayehun AF, Olowookere OO, Ogunbode AM, Adetunji AA, Esan A. Walking prescription of 10 000 steps per day in patients with type 2 diabetes mellitus: a randomised trial in Nigerian general practice. Br J Gen Pract. 2018;68(667):e139–e145. [PubMed: 29335328]
23. Johnson ST, Mundt C, Qiu W, et al. Increase in daily steps after an exercise specialist led lifestyle intervention for adults with type 2 diabetes in primary care: a controlled implementation trial. J Phys Act Health. 2015;12(11):1492–1499. [PubMed: 25634940]
24. Pariser G, Hager K, Gillette P, Golemboski K, Jackson K. Active steps for diabetes:a community-campus partnership addressing frailty and diabetes. Diab Educ. 2014;40(1):60–67.
25. Johnson ST, Eurich DT, Lytvyak E, et al. Walking and type 2 diabetes risk using CANRISK scores among older adults. Appl Physiol Nutr Metab. 2017;42(1):33–38. [PubMed: 27903089]
26. Saint-Maurice PF, Troiano RP, Bassett Jr. DR, et al. Association of daily step count and step intensity with mortality among US adults. JAMA. 2020;323(12):1151–1160. [PubMed: 32207799]

Table 1

Patient characteristics ($N = 62$).

Continuous variables	**Mean (SD)**
Age (years)	67.6 (6.0)
Anthropometry	
Height (inches)	66.3 (10.0)
Weight (lbs.)	216.6(38.6)
BMI (kg/m^2)	33.5(4.8)
Categorial variables	***N* (%)**
Male	57(91.9)
Ethnic group	
Hispanic	36(58.1)
African American	7 (11.3)
Non-Hispanic White	19(30.7)
Education, years	13.9(2.5)
Tobacco use, current	5(11.4)
Comorbidities	
Diabetes	62 (100)
Hypertension	58 (93.6)
Coronary artery disease	21 (33.9)
Stroke	2 (3.2)

Table 2

Change in characteristics from baseline to follow-up at 6–8 weeks.

Variables	Baseline Mean (SD)	Follow-up Mean (SD)	*P*-value
Body mass index, kg/m^2	33.5 (5.6)	33.1 (4.7)	0.040
Steps per day, number	4406.2 (2293.7)	5808.6 (2876.2)	0.001
HbA1c, 3 months post, %	8.5 (1.6)	8.0 (1.2)	0.012
HbA1c, 6 months post, %	8.2 (1.6)	7.8 (1.3)	0.006
HbA1c, 12 months post, %	8.1 (1.5)	7.8 (1.4)	0.031
10-foot walk, s	2.77 (0.44)	2.56 (0.42)	<0.001
Timed Up and Go, s	10.2 (1.8)	9.3 (1.7)	<0.001