Supervised Walking Groups to Increase Physical Activity in Type 2 Diabetic Patients

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OBJECTIVE — To evaluate the impact of an exercise program organized into supervised walking groups in subjects with type 2 diabetes.

RESEARCH DESIGN AND METHODS — Fifty-nine diabetic subjects were randomized to a control group receiving standard lifestyle recommendations or an intervention group assigned to three supervised walking sessions per week and counseling. Changes in metabolic features, weight, 6-min walk test, prescription of antidiabetic medications, and overall physical activity were assessed.

RESULTS — Functional capacity and overall physical activity were higher in the intervention group, whereas metabolic changes were not different between groups after 4 months. However, in subjects who attended at least 50% of scheduled walking sessions, changes in A1C and fasting glucose were greater than in control subjects. Discontinuation or reduction of antidiabetic drugs occurred in 33% of these patients versus 5% of control subjects ($P < 0.05$).

CONCLUSIONS — Supervised walking may be beneficial in diabetic subjects, but metabolic improvement requires adequate compliance.

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Exercise can attenuate hyperglycemia in diabetic subjects (1,2) and also reduces cardiovascular events (3,4). However, it still remains unclear how this evidence can be transferred into clinical practice, considering the very large size and the characteristics of the diabetic population, made up predominantly of elderly, sedentary, and overweight patients.

Walking is a typical mild-moderate aerobic exercise that is easy to organize and does not require specific skills, expensive equipment, or sophisticated preliminary medical evaluations. However, self-paced walking seems inadequate to improve metabolic control in these patients (5).

In this pilot study, we assessed the feasibility and effectiveness of an intervention based on the organization of supervised walking groups.

RESEARCH DESIGN AND METHODS

— Fifty-nine subjects were recruited from the Diabetic Outpatient Clinic of the City Hospital of Verona, Italy. Inclusion criteria were type 2 diabetes known for at least 2 years, physical inactivity, age 50–75 years, and A1C 6.5–9.9%. Admitted treatments were diet, oral hypoglycemic agents, and bedtime insulin. Exclusion criteria were moderate-severe complications of diabetes, intercurrent diseases, use of β-blockers, and unsuitability for the exercise program.

A1C, fasting glucose, and lipid profile were measured, and functional capacity was assessed by a 6-min walk test (6-mWT) (6). Patients were asked to record all physical activities, to estimate energy expenditure (7), and to perform home blood glucose monitoring.

Subjects were assigned with a 1:2 ratio, by a randomization table, into a control group ($n = 21$) or an intervention group ($n = 39$). Control subjects received standard instructions aimed at encouraging physical activity. The intervention group was organized into walking groups, and exercised three times weekly for 45 min under the supervision of a personal trainer. Intensity of exercise was increased gradually from low to moderate. Before starting the program and 2 months thereafter, these subjects participated in one individual and one group counseling session (8).

An interim visit was scheduled after 2 months to adjust, if necessary, antidiabetic treatments. Patients were instructed to ask for additional visits if they recorded hypoglycemias and to maintain an isocaloric diet.

After 4 months, baseline procedures were repeated. The efficacy of intervention was established by changes in A1C (primary outcome) and other metabolic parameters, attendance at the walking sessions, changes in overall physical activity and distance traveled in the 6-mWT, and variation in prescription of antidiabetic medications.

The study was approved by the Ethics Committee of Verona Hospital, and participants gave their written informed consent.

Between- and within-group comparisons were conducted with Student *t* test for unpaired and paired data, ANOVA for repeated measures, and Fisher test for multiple comparisons. Univariate regression analyses were used to correlate changes in relevant parameters. Skewed variables were log-transformed before

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Table 1—*Comparison of changes observed in subjects who attended at least 50% of supervised walking sessions and in control subjects*

	Intervention group		Control group		
	Baseline	4 months	Baseline	4 months	*P*
n	21	21	20	20	
Age (years)	65.7 ± 4.9		65.7 ± 5.2		
Duration of diabetes (years)	10.7 ± 7.4		11.9 ± 8.4		
Body weight (kg)	75.4 ± 11.5	74.5 ± 11.3	77.7 ± 12.7	77.4 ± 12.8	0.49
BMI (kg/m^2)	29.2 ± 4.2	28.9 ± 4.2	29.5 ± 4.9	29.3 ± 4.7	0.63
A1C (%)	7.50 ± 0.72	7.23 ± 0.64*	7.39 ± 0.48	7.34 ± 0.53	0.01
Glucose (mg/dl)	154 ± 39.5	140 ± 29.8†	148 ± 20.4	150 ± 25.8	0.05
Total cholesterol (mg/dl)	179 ± 32	175 ± 28	177 ± 34	178 ± 36	0.32
HDL cholesterol (mg/dl)	51.4 ± 10.9	52.0 ± 12.4	54.7 ± 11.4	52.7 ± 11.1	0.29
LDL cholesterol (mg/dl)	104.2 ± 29.8	100.9 ± 25.1	98.9 ± 28.4	101.6 ± 29.5	0.24
Triglyceride (mg/dl)	119 ± 51.1	109 ± 49.4	116 ± 43.0	118 ± 48.4	0.21
Systolic blood pressure (mmHg)	133 ± 14.5	134 ± 13.9	133 ± 16.0	134 ± 16.1	0.96
Diastolic blood pressure (mmHg)	80 ± 6.2	78 ± 7.1	75 ± 6.5	77 ± 8.0	0.15
6-mWT (m)	521 ± 37.2	612 ± 78.8*	554 ± 49.2	574 ± 60.8†	0.001
Energy expenditure through voluntary physical activity (MET h × week)	10.0 ± 11.2	18.6 ± 10.1*	11.9 ± 11.9	14.9 ± 10.3	0.008
Changes to antidiabetic medication regimen					
Dose increased	—	5	—	5	
Dose decreased or therapy discontinued	—	33	—	5	0.05
No change to regimen	—	62	—	90	

Data are means ± SD or percent, unless otherwise indicated. *P* values refer to comparison between intervention and control groups by ANOVA for repeated measures or, for comparison in changes to antidiabetic regimen, by Fisher exact test. In this analysis, subjects were grouped according to whether or not they had a reduction in antidiabetic medications. *<0.001 intragroup comparison; †<0.05 intragroup comparison.

analysis. The Fisher exact test was used to compare changes in antidiabetic therapy between groups. Results are shown as means ± SD. The level of significance was $P \leq 0.05$.

RESULTS — At baseline, the two groups were similar. Eight subjects in the intervention group abandoned the protocol because of lack of time ($n = 5$) or persistent articular pain ($n = 3$). One subject was excluded because of difficulties in completing the walking sessions. One subject in the control group was lost to follow-up.

In the intervention group 7 of 39 and in the control group 1 of 21 subjects reported mild hypoglycemias (P = NS).

By intention-to-treat analysis, at the end of the study the intervention group showed significant reductions in A1C and total cholesterol (−0.12 mg/dl [0.37%] and −6.4 mg/dl [18.5%], respectively, both $P < 0.05$). However, differences in metabolic improvement between groups did not reach statistical significance. Distance covered in the 6-mWT and calculated energy expenditure increased in both groups. However, changes were greater in the intervention group (both $P < 0.01$). Change in overall physical activity correlated with reduction in body weight ($r = 0.51$, $P = 0.005$).

Average attendance at walking sessions was 60%. Because there was a wide individual range (14–90%) in participation in scheduled activities, a secondary analysis was carried out including only subjects whose attendance was at least 50% ($n = 21$). Table 1 shows changes observed in this subgroup and in control subjects. Changes in A1C, fasting glucose, distance covered in the 6-mWT, and energy expenditure were significantly greater in these subjects than in control subjects. Reduction or discontinuation of antidiabetic drugs occurred in 33% of patients in the intervention group versus 5% of control subjects ($P < 0.05$).

In multivariate analyses, A1C reduction was predicted by baseline A1C and BMI, but not by sex, baseline physical activity, or functional capacity. Compliance was predicted only by the female sex.

CONCLUSIONS — In our study, several patients included in the intervention group did not complete the program, and remaining subjects attended only 60% of the scheduled sessions. Accordingly, reduction of A1C levels, the primary outcome, was not significantly different from that in control subjects. However, the improvement in functional capacity and energy expenditure was greater in the intervention group. This difference was not entirely explained by participation in supervised walking, indicating an active effort by many patients of this group to increase physical activity. Moreover, in a secondary analysis carried out in subjects whose attendance in scheduled activities was at least 50%, changes in A1C were higher than in control subjects.

Interestingly, prescription of antidiabetic medications was reduced in 33% of subjects in the intervention group versus only 5% in the control group. These data add value to the differences in metabolic control changes between groups, strongly supporting the efficacy of this model in diabetic subjects with adequate compliance.

Until now, only a few small-sized studies assessed the efficacy of walking in diabetic subjects, and results were controversial (9–12). Notably, because of the low walking speed typical of diabetic patients, self-paced walking seems insufficient to improve the metabolic control in these subjects (5). Our study adds to these findings by showing that organization of supervised walking groups may be beneficial from several points of view in these subjects, provided that attendance is at least 50% of scheduled sessions.

In conclusion, supervised walking may induce favorable metabolic changes

and increase functional capacity in diabetic subjects, but compliance remains a crucial issue. This model was associated with a reduced prescription of antidiabetic drugs, suggesting an improved quality of life as well as a financial saving.

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