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**Research Article**

# Community based diabetes prevention programme in older adults in a Greek rural area

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## ABSTRACT

**Background:** Type 2 Diabetes (T2D) is one of the commonest non-communicable diseases. The purpose of this study was to examine the impact of a two-year, non-intensive lifestyle intervention programme to prevent type 2 diabetes (T2D) in older people, held in 'real world' community rural settings.
**Methods:** A total of 34 participants, 66±6 years old, at high risk for T2D were recruited from the open protective centres of elderly in a Greek rural town. The intervention included 16 group sessions for the intervention group and one session at baseline for the control group, delivered by a registered dietitian. Clinical and metabolic factors, dietary habits and physical activity were measured.
**Results:** Analyses of between-group differences at year 1 revealed that the participants in the intervention group achieved greater decreases in weight (-0.8±1.9 versus 1.7±3.8 kg, p=0.021), waist circumference -1 (-2 -1) cm (p=0.027), diastolic blood pressure (-2.89±14.71 versus 15.85±20.19 mmHg, p=0.044), LDL-C (-22.29±31.42 versus -2.60±19.84 mg/dl, p=0.05), in energy intake (-202.6±409.2 versus 194.3±453.7 kcal/day, p=0.015) and saturated fat intake (-4.8±13.7 versus 5.1±11.8g/day, p=0.044).The fiber consumption was significantly greater in the intervention group (3.7±2.2 versus -0.1±2.8g/day, p=0.001). At year 2, significant differences were observed in waist circumference (-2.3±3.5 vs. 2.9±7.1cm, p=0.019), diastolic blood pressure (-1.38±14.29 versus 13.5±16.06 mmHg, p=0.021), energy intake (-228.6±513.4 versus 264.5±462.1kcal/day, p=0.021) and fat intake (-16±30.2 versus 10.8±30.3g/day, p=0.037).
**Conclusions:** The implementation of a non-intensive lifestyle intervention programme to prevent T2D in older adults in a rural community setting is practical and can have a favourable impact on clinical and metabolic parameters.

**Keywords:** Lifestyle intervention, Older people, Prevention, Type 2 diabetes

## INTRODUCTION

Type 2 diabetes (T2D) is one of the commonest non-communicable diseases. In most countries diabetes has increased alongside rapid culture and social changes: ageing populations, increasing urbanization, dietary changes, reduced physical activity and unhealthy behaviors.[1-5] Population growth and prolonged life expectancy have contributed to a steady increase in the number of older people aged 60 years or over who constitute more than 11.1% of the world's population.[6]

At present, there is a lot of evidence that lifestyle changes can help prevent the development of T2D. Landmark clinical trials have shown that primary prevention can delay and possibly prevent the onset of diabetes in individuals at high risk. Intensive lifestyle and pharmacological interventions reduce the rate of progression to T2D in people with impaired glucose tolerance (IGT). Many randomized controlled trials of structured lifestyle modification have consistently demonstrated that achieving and maintaining a healthy body weight through a combination of a change in dietary behaviors and an increase of physical activity reduces the incidence of T2D in adults at high risk by 42-67%, while the effect of pharmacological interventions decreased after intervention was terminated. Encouraged by these results, there have been many attempts to translate the prevention trials into community-based programmes. Small community-based programmes have reported some success in modifying surrogate markers for diabetes through lifestyle intervention.[7-24]

These trials and small community-based programmes primarily enrolled middle-aged participants. Only in the U.S. Diabetes prevention program (DPP), which is the largest trial to date, 20% of the participants were aged ≥60 years at enrollment. Prediabetes lifestyle interventions for relatively healthy people aged 60 years or older seem to be highly cost-effective, although evidence is sparse. Furthermore, modelling studies for diabetes prevention which encompass a screening stage, indicate that screening for T2D and IGT, with appropriate intervention for those with IGT, in an above average risk, overweight and obese population, aged ≥55 years, seems to be cost effective.[25-29]

As there is a lack of evidence of community-based diabetes prevention programmes in older adults at high risk and following the implementation of the first Greek community-based programme in a sample of the general population in Athens, we evaluated the effects of a 2-year community-based diabetes prevention programme, in relatively healthy people, aged ≥55 years, with high risk of developing T2D in a Greek rural area, on body weight as well as metabolic factors, through a combination of changes in dietary habits and an increase in physical activity (PA).[21]

## METHODS

This programme is a group-randomized intervention study involving two open protective centres of elderly (OPCE) in the Greek town of Aegio. The protocol was approved by the Ethical Committee of the Department of Nursing, National and Kapodistrian University of Athens, and the Eastern Achaia General Hospital's Scientific Council. All participants gave written informed consent according to the general recommendations of the declaration of Helsinki.

A dietician visited the two OPCE and distributed the validated Finnish type 2 diabetes risk score (FINDRISC) questionnaire, in order to identify individuals aged 55-75 years at high risk of developing T2D. Its completion was conducted by face-to-face sessions with all inhabitants of the OPCE. The high risk persons identified with a FINDRISC score ≥12 (maximum 26), were informed in detail about the programme and were invited to undergo an oral glucose tolerance test (OGTT) in order to exclude people with unknown diabetes. Those who accepted to undergo the OGTT, and after excluding the ones with screen-detected diabetes (based on the 2006 world health organization criteria), were invited to participate in the study and were asked to sign an informed consent form. They were randomly allocated to the intervention group or the control group. Randomization was stratified by centre. During the OGTT, the validated Food Frequency questionnaire (FFQ) and the validated short international physical activity questionnaire (IPAQ-short) were filled by face-to-face sessions.[30,31] Weight, height, waist circumference and blood pressure were measured and the medical histories recorded.

The exclusion criteria were 1) diagnosis of diabetes, 2) coronary artery disease, 3) chronic diseases with little chance of survival for 5 years (e.g., cancer), 4) clinical conditions, such as diseases of the thyroid gland and the liver which could affect the glucose metabolism, and 5) other conditions with psychological or physical disabilities which could influence the participation in the study.

### *Goals of the intervention programme*

The main goals of the lifestyle intervention were based upon available evidence on diabetes risk factors according to the Finnish diabetes prevention study (DPS). They were 1) weight loss ≥5% for overweight and obese individuals, 2) carbohydrate intake 50-55% of total energy, 3) total fat intake <35% of total energy, of which saturated fat <10%, 4) fiber consumption ≥15 gr/1000 kcal, and 5) achieving moderate intensity physical activity ≥30 min/day.[12]

### *Intervention group*

The 2-year intervention programme consisted of sixteen group sessions, lasting 1 hour each (10 persons/group) held by a registered dietitian at one OPCE. In every session, information on diabetes risk factors, healthy lifestyle, individualized discussions focusing on specific individual problems and printed material were provided. In addition, individualized nutritional programmes were drafted in each participant in order to reduce body weight. Levels of energy intake were calculated by estimating the daily energy needs to maintain the present body weight, decreased by 500-1000 calories, so as to lose 0.5-1 kg per week. The recommended carbohydrate intake was being constituted by 50-55% of daily total energy, fat intake 35% of total energy and cholesterol of 300 mg. The recommended protein intake constituted about 1gr per kg of ideal body weight and fiber intake over 15 gr per 1000 kcal. No formal exercise sessions were provided, except for general counselling to increase physical activity. In each session, each participant presented a three-day food records for the evaluation of the five individual nutritional goals, which recorded the exact amount and type of consumed food and the way of cooking as well as the IPAQ-short for the evaluation of the duration and intensity of physical activity.

### *Control group*

At baseline, the participants in the control group were allocated into two group sessions, lasting 1 hour each, held by a registered dietitian at the second OPCE. The subjects, who finally attended, were given general information about lifestyle and diabetes risk and some printed material was delivered.

### *Annual measurements and biochemical assessments*

All study subjects had fasting plasma glucose (FPG), postprandial glucose 2h after 75g oral glucose (2h-glucose), total cholesterol (CHOL), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), triglycerides (TG) and anthropomentric measurements, at baseline, 1$^{st}$ and 2$^{nd}$ year.

Additionally, the FFQ and the IPAQ-short were repeated annually. Diabetes diagnosis was confirmed by an additional measurement of HbA1c and induced termination of the study.

Those subjects who terminated the follow-up prematurely were defined as dropouts. Nevertheless, data from their earlier visits were included in the analyses.

Furthermore, those participants of the intervention group who did not participate at any session were excluded and their data were not included in the analyses.

Plasma glucose, total-CHOL, HDL-C, and TG levels were measured at the laboratory of Eastern Achaia General Hospital, using enzymatic assays. LDL-C was calculated using the Friedewald equation.

### *Assessments of dietary intake*

The annual FFQ and the monthly three-day food records were used for the evaluation of the five individual nutritional goals. The FFQ included information of all main food groups that are consumed around the world (i.e. 69 questions regarding consumption of dairy products, cereals, fruits, vegetables, meat, fish, legumes, sweets, etc), as well as dietary behaviors. The amounts of food consumed were expressed either in gr or in other common measures, such as slice, tablespoon or cup, representing the standard serving size. A 6-grade scale, providing the options for the frequency consumption, was used ranging from never/rarely, 1 to 3 times/month, 1 to 2 times/week, 3 to 6 times/week, 1 times/day, to ≥2 times/day.[30]

The nutrient intakes were calculated using the dietary tables based on the book “composition tables of foods and Greek dishes.[32]

### *Assessment of physical activity*

The study subjects completed the validated IPAQ-short at baseline, monthly and annual measurements. The Greek IPAQ-short is a 7-item instrument consisting of six questions that subjects are asked to answer in order to record the number of days (frequency) and the number of minutes per day (duration) of their participation in all kinds of vigorous, moderate and walking physical activities (PA) during the last seven days. In addition, a seventh question records the time that subjects spend sitting during an average weekday. The PA score (PAscore) for each vigorous, moderate and walking PA was calculated and expressed in MET-minutes per week (MET.min.wk$^{-1}$).[31] The goal of achieving moderate intensity physical activity ≥30 min/day was expressed as ≥700 MET.min.wk$^{-1}$.

### *Statistical analysis*

Differences between the intervention and control group were tested by paired student’s *t*-test. Non-parametric variables were tested by Wilcoxon Mann-Whitney test. Associations between categorical variables were tested by the $\chi^2$-test. All reported *p*-values are from two-sided tests and compared with a significance level of 5%. Data were analyzed using SPSS version 21 (IBM SPSS Inc., Chicago, IL, USA).

## RESULTS

Out of 79 FINDRISC questionnaires initially distributed, 67 high-risk individuals aged 55-75 years were identified, 56 (83.6%) of whom agreed to undergo the OGTT and 5 (8.9%) were diagnosed with unknown, screen-detected T2D. The 12 subjects were excluded because of the exclusion criteria. The remaining 39 nondiabetic subjects were invited to participate in the study and were asked to sign an informed consent form (21 participants in the intervention group and 18 in the control group). Noteworthy is the fact that the response of men was small: 2 men out of 21 in the intervention group and 3 out of 18 in the control group from the remaining 51 nondiabetic subjects agreed initially to participate but they ultimately changed their mind. Finally, 19 women of the intervention group and 15 women of the control group agreed to participate.

Table 1 shows the baseline characteristics of the participants, which did not differ between the two groups. All participants had a moderate intensity physical activity ≥30 min/day which was expressed as ≥700 MET.min.wk$^{-1}$. Of the 19 participants in the intervention group, 2 had BMI <25 kg/m$^2$ and 13 had BMI >30 kg/m$^2$; also, 9 out of the 15 subjects in the control group had BMI >30 kg/m$^2$, while 6 had BMI 25-30 kg/m$^2$.

**Table 1: Baseline characteristics of 34 women.**

| | Control group | Intervention group |
|---|---|---|
| ***N*** | 15 | 19 |
| **Age (years)** | 66±6 | 65±6 |
| **Schooling in years (*N*)** | | |
| 0-6 | 14 | 18 |
| 6-12 | 0 | 1 |
| **Height (m)** | 1.56±0.06 | 1.55±0.06 |
| **Weight (kg)** | 77.6±10.5 | 74.8±11.6 |
| **BMI (kg/m$^2$)** | 31.9±5.5 | 31.2±4.3 |
| **Waist circumference (cm)** | 112.2±12.3 | 108.3±8.6 |
| **Fasting plasma glucose (mg/dl)** | 89±9 | 95±12 |
| **2-h plasma glucose (mg/dl)** | 110±29 | 127±35 |
| **Systolic blood pressure (mmHg)** | 130±22 | 134±22 |
| **Diastolic blood pressure (mmHg)** | 69±12 | 77±14 |
| **Antihypertensive medication (n)** | 10 | 9 |
| **Lipid-lowering medication (n)** | 9 | 9 |
| **Serum total cholesterol (mg/dl)** | 213±38 | 217±31 |
| **Serum HDL cholesterol (mg/dl)** | 67±13 | 65±15 |
| **Serum total cholesterol-to-HDL cholesterol ratio** | 3.3±0.8 | 3.5±1.1 |
| **Serum LDL cholesterol (mg/dl)** | 123.3±34 | 127.7±31 |
| **Serum triglycerides (mg/dl)** | 113±39 | 121±47 |
| **Physical Activity (MET.min.wk$^{-1}$)** | 1530.7±1401.6 | 1720.2±1497.6 |
| **Energy (kcal/day)** | 2022.47±454.38 | 2214.65±782.70 |
| **Carbohydrates intake** | | |
| g/day | 180.72±69.33 | 199.76±91.24 |
| % | 34.76±6.84 | 35.94±7.45 |
| **Fat intake** | | |
| g/day | 111.44±24.54 | 130.17±52.12 |
| % | 49.92± 5.43 | 50.9±7.1 |
| **Saturated fat intake** | | |
| g/day | 33.75±11.01 | 33.27±17.58 |
| % | 14.9±3.23 | 14±2.62 |
| **Cholesterol intake (mg/day)** | 274.27±134.32 | 274±144.94 |
| **Dietary Fiber** | | |
| g/day | 17.78±8.29 | 18.46±8.21 |
| g/1000 kcal | 8.8±3.06 | 8.26±2.92 |

Data are mean ± SD or median (interquartile range).

### *Clinical and metabolic outcomes*

Favourable changes in clinical and metabolic characteristics were observed in the intervention group compared with the control group, especially at the 1st year and less so at the 2nd year analyses (Table 2). Specifically, at the 1st year, the participants in the control group gained weight, contrary to the participants of the intervention group who lost weight (1.7±3.8 versus -0.8±1.9 kg, respectively, $p$=0.021). Analogous changes were observed in the waist circumference [2(0 -4) versus -1(-2 -1) cm, differences were observed in diastolic blood pressure and LDL-C. No statistically significant differences were seen in BMI, systolic blood pressure, serum CHOL, and serum HDL-C. During the 1st year, 2 subjects in the control group developed diabetes ($p$>0.05, $\chi^2$ test).

At year 2, differences were attenuated and remained significant for the waist circumference (-2.3±3.5 versus 2.9±7.1 cm, $p$=0.019), and diastolic blood pressure (-1.38±14.29 versus 13.5±16.06 mmHg, $p$=0.021). No significant reductions were seen in the rest of the parameters studied.

The subjects with glucose dysregulation (IFG and/or IGT) were not improved by the intervention.

**Table 2: Differences in clinical and metabolic characteristics from baseline to year 1 and 2.**

| | From baseline to year 1 | | | From baseline to year 2 | | |
|---|---|---|---|---|---|---|
| | Control group | Intervention group | *P* | Control group | Intervention group | *P* |
| *N* | 13 | 19 | | 10 | 16 | |
| Weight (kg) | 1.7±3.8 | -0.8±1.9 | **0.021** | 0.6±2.9 | -0.6±2.7 | 0.276 |
| BMI (kg/m$^2$) | 0.4±1.2 | -0.3±0.9 | 0.052 | 0.7±1.8 | -0.2±1.2 | 0.118 |
| Waist circumference (cm) | 2 (0 – 4) | -1 (-2 – 1) | **0.027** | 2.9±7.1 | -2.3±3.5 | **0.019** |
| Fasting plasma glucose (mg/dl) | 1.46±7.02 | 4±16.9 | 0.564 | -0.6±10.59 | -1.37±18.51 | 0.905 |
| 2-h plasma glucose (mg/dl) | -0.62±29 | 13.47±52.51 | 0.387 | 26.20±33.15 | -2.79±42.24 | 0.085 |
| Systolic blood pressure (mmHg) | 9.08±20.43 | -4.21±22.48 | 0.099 | -0.7±24.57 | -13.06±21.15 | 0.185 |
| Diastolic blood pressure (mmHg) | 15.85±20.19 | -2.89±14.71 | **0.044** | 13.5±16.06 | -1.38±14.29 | **0.021** |
| Serum total cholesterol (mg/dl) | 7.31±22.73 | -4.05±33.73 | 0.298 | -1±35.1 | 3.81±35.66 | 0.739 |
| Serum HDL cholesterol (mg/dl) | 8.85±7.9 | 15.42±13.24 | 0.09 | 1.8±8.94 | 0.7±9.42 | 0.770 |
| Serum total cholesterol-to-HDL cholesterol ratio | -0.36±0.5 | -0.76±0.81 | 0.123 | -0.13±0.71 | -0.14±0.86 | 0.965 |
| Serum LDL cholesterol (mg/dl) | -2.6±19.84 | -22.29±31.42 | **0.050** | -2.68±31.97 | 3.95±31.8 | 0.61 |
| Serum triglycerides (mg/dl) | 5.31±33.76 | 14.11±30.58 | 0.449 | -0.6±29.77 | -4.19±48.84 | 0.837 |

Data are mean ± SD or median (interquartile range); *P*-values in bold are statistically significant.

**Table 3: Differences in nutrient intake and physical activity from baseline to year 1 and 2.**

| | From baseline to year 1 | | | From baseline to year 2 | | |
|---|---|---|---|---|---|---|
| | Control group | Intervention group | *P* | Control group | Intervention group | *P* |
| ***N*** | 13 | 19 | | 10 | 16 | |
| **Energy (kcal/day)** | 194.3±453.7 | -202.6±409.2 | **0.015** | 264.5±462.1 | -228.6±513.4 | **0.021** |
| **Carbohydrates** | | | | | | |
| g/day | 19.5±50.4 | 2.7±53 | 0.379 | 29.1±48.8 | -5.4±55.2 | 0.118 |
| % | 0.8±6.2 | 4.3±5.2 | 0.105 | 37.9±104.3 | -3.2±8.0 | 0.320 |
| **Fat** | | | | | | |
| g/day | -6.6 (-13.1 – 9) | -20.1 (-34.7 – -3.1) | 0.074 | 10.8±30.3 | -16±30.2 | **0.037** |
| % | -2.1±4.8 | -3.5±6.6 | 0.510 | -0.8±4.3 | -1.5±11.4 | 0.869 |
| **Saturated fat** | | | | | | |
| g/day | 5.1±11.8 | -4.8±13.7 | **0.044** | 3.3±7.5 | -2.1±12.8 | 0.241 |
| % | -0.5±5.4 | -1.4±3.1 | 0.557 | -0.2±2.6 | -0.3±2.6 | 0.913 |
| **Cholesterol (mg/day)** | 1.1 ±117.8 | -51±113.5 | 0.218 | -7±138.6 | -41±84.7 | 0.444 |
| **Dietary Fiber** | | | | | | |
| g/day | 1.6±8.1 | 5.4±4.1 | 0.14 | 0.6±2.9 | -0.6±2.7 | 0.276 |
| g/1000kcal | -0.1±2.8 | 3.7±2.2 | **0.001** | 0.8±2.5 | 3.0±4.8 | 0.182 |
| **Physical Activity** (MET.min.wk$^{-1}$) | 535.65±1890.14 | 727.89±1660.44 | 0.763 | 52.25±1556.06 | 586.59±1365.74 | 0.366 |

Data are mean±SD. *P*-values in bold are statistically significant.

### *Dietary intake and physical activity*

Beneficial changes were observed in nutrient intake and physical activity (Table 3). At year 1, significant reductions in energy intake (-202.6±409.2 versus 194.3±453.7 kcal, *p*=0.015) and saturated fat intake (-4.8±13.7 versus 5.1±11.8 g, *p*=0.044) were seen in the intervention group compared with the control. Moreover, the fiber consumption was significantly greater in the intervention group (3.7±2.2 versus -0.1±2.8 g, *p*=0.001). Favourable changes were seen in carbohydrate, fat and cholesterol intake, but not statistically significant. Although all participants had a moderate intensity PA ≥700 MET.min.wk$^{-1}$, those in the intervention group had a tendency for more increased PA compared to those in the control group (727.89±1660.44 versus 535.65±1890.14 MET.min.wk$^{-1}$, *p*=0.763).

At year 2, significant reductions in energy intake (-228.6±513.4 versus 264.5±462.1kcal/day, *p*=0.021) and fat intake (-16±30.2 vs. 10.8±30.3g/day, *p*=0.037) were seen in the intervention group compared with the control one. No significant differences were observed in carbohydrate, saturated fat and cholesterol intake.

The specific goals of the intervention were not reached by any subject. Only the saturated fat intake goal was reached by 31.58% and 25% (*p*<0.05*)* of the intervention group subjects at year 1 and 2, respectively.

### *Adherence to the intervention*

Adherence to the intervention sessions varied from 47.4% to 84.2% at year 1 (maximum 8 sessions) and 36.8% to 73.7% at year 2 (maximum 8 sessions). High adherence (≥6 meetings) had the 52.63% of participants at year 1 and the 59.25% at year 2. No association was observed between attendance and clinical and metabolic parameters.

## DISCUSSION

The purpose of this study was to examine the impact of a two-year, non-intensive lifestyle intervention programme for the prevention of T2D in older adults (55-75 years old), residing in a rural area, on clinical and metabolic parameters, dietary behaviors and physical activity, held in 'real world' community settings. There are no previous community-based diabetes prevention programmes in older adults at high risk for T2D development in rural areas, as the trials and the small community-based programmes primarily enrolled middle-aged participants in urban settings, and so the comparison of outcomes is difficult. Only in the intensive and highly costly DPP, which is the largest trial to date, 20% of the participants were aged ≥60 years at enrollment. These participants seemed to have more benefits from the lifestyle intervention than the younger participants, but did not appear to benefit from metformin. Follow-up of the DPP cohort for 10 years after randomization showed ongoing greater impact of the original lifestyle intervention in older participants (49% risk reduction in those aged ≥60 years at randomization vs. 34% for the total cohort), and additional benefits of the lifestyle intervention that might impact older adults, such as improvements in cardiovascular risk factors.[25]

The key factor that reduces diabetes risk is weight loss and thus all efforts to translate the prevention trials to a community setting have focused on weight reduction. Small community-based programmes have reported minor success in weight reduction and modifying surrogate markers for diabetes through lifestyle intervention.[16-22] The first Greek community-based programme in a sample of the general population in Athens reported modest weight loss (-1.0 kg) and the weight reduction of the good ageing in lahti region (GOAL) lifestyle implementation trial in Finland achieved similarly low weight loss (-1.0 kg).[18,21] There is a lack of formal comparisons, while the follow-up of these studies was short (12 months). In the 2-year healthy living partnerships to prevent diabetes study, the weight loss was -6.9 kg in the first year and -5.2 kg in the second year. However, the intervention was intensive, as in the DPP and DPS.[24] In our rural, community-based intervention strategy, the weight reduction was -0.8±1.9 kg in the intervention group compared with a gain of 1.7±3.8 in the control group at year 1. However, this difference was not maintained in the second year.

Furthermore, a low level of participation in the programme is observed in all community-based diabetes risk-screening events. The majority of individuals in our study refused to undergo an OGTT because of the unpleasant procedure, as they stated. In all studies, more women than men attended the programmes.[18-23,33-35] In our programme, men refused to participate. This suggests that a range of different approaches may be needed to engage people who are at risk for diabetes and emphasis should therefore be put on indentifying the barriers to male attendance.

Improved nutritional habits, especially the significant decrease of daily energy, saturated fat and increase of dietary fiber, produced beneficial effects, like reduction in hypertension and hyperlipidemia, as other trials and community-based programmes have shown.[13-24,36] The non-significant decrease in other metabolic factors could be attributed to the fact that their baseline levels were normal. The high quantity of fat consumption was explained because of the extremely high consumption of olive oil and nuts, the basic characteristics of the Mediterranean diet.[37-40]

This was a small community-based study and has some notable limitations. First, the sample size was quite small because of the low level of participation. Secondly, older people already suffer from chronic diseases so many had been excluded because of the exclusion criteria. Thirdly, there was a bias attributable to interaction and intervention contamination between the participants which was not a significant obstacle to the effectiveness of intervention because the randomization was stratified by centre. While these early results are encouraging, the sample was small and self-selected, follow-up was short, this study provides evidence that the implementation of a non-intensive, non-costly lifestyle intervention programme to prevent T2D in older adults, residing in a rural community is practical and feasible, as previous programmes had presented.[39,40] The main challenge is to translate this evidence into a routine community-wide setting and provide a feasible, effective and cost-effective intervention, while the current practice requests less expensive, simple interventions which can be easily carried out in daily practice. Furthermore, the low level of participation in the community-based diabetes risk-screening events suggests that a range of different approaches may be needed to engage people who are at risk for diabetes.

## CONCLUSION

The implementation of a non-intensive lifestyle intervention programme to prevent T2D in older adults in a rural community setting is practical and can have a favourable impact on clinical and metabolic parameters.

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