

A lifestyle intervention continued to prevent type 2 diabetes in high-risk patients after the program was stopped

Lindström J, Ilanne-Parikka P, Peltonen M, et al. Sustained reduction in the incidence of type 2 diabetes by lifestyle intervention: follow-up of the Finnish Diabetes Prevention Study. *Lancet*. 2006;368:1673-9.

Clinical impact ratings: GIM/FP/GP ★★★★★☆ Endocrinology ★★★★★☆

QUESTION

In overweight patients with impaired glucose tolerance, are the benefits of a lifestyle intervention for preventing type 2 diabetes maintained after the program is stopped?

METHODS

Design: Randomized controlled trial.

Allocation: Unclear allocation concealment.*

Blinding: Blinded {study nurse and laboratory staff}†.*

Follow-up period: Median 7 years (median 3 y postintervention).

Setting: 5 centers in Finland.

Patients: 522 patients {40 to 65 years of age}‡ (mean 55 y, 67% women) with {body mass index ≥ 25 kg/m²}‡ (mean 31 kg/m²) and impaired glucose tolerance {(plasma glucose level 140 to 200 mg/dL [7.8 to 11.0 mmol/L] 2 h after a 75-g oral glucose tolerance test and fasting plasma glucose level < 140 mg/dL [7.8 mmol/L])}‡ on 2 occasions. Exclusion criteria included {previous diagnosis of diabetes and life expectancy < 6 y}‡.

Intervention: Lifestyle intervention, involving a median 20 individual dietary counseling sessions with a nutritionist and advice to increase physical activity, including the opportunity to participate in individualized training sessions, continued for a median 4 years ($n = 265$), or general oral and written information about diet and exercise (control) ($n = 257$).

Outcomes: Type 2 diabetes (fasting plasma glucose level ≥ 140 mg/dL [7.8 mmol/L] or plasma glucose level > 200 mg/dL [11.0 mmol/L] 2 h after a glucose challenge) and proportion of patients who achieved ≥ 4 of the 5 goals of the intervention (weight loss $\geq 5\%$, $< 30\%$ of energy intake from fat, $< 10\%$ of energy intake from saturated fat, fiber intake ≥ 15 g/1000 kcal, and moderate physical activity ≥ 30 min/d).

Patient follow-up: 91% (intention-to-treat analysis).

MAIN RESULTS

The incidence of type 2 diabetes was lower in the intervention group than in the control group over both the entire follow-up period and the postintervention period (Table). During the intervention period, the intervention group achieved lower mean body weight and intake of total and saturated fat and higher mean intake of dietary fiber and physical activity levels than the control group. These benefits were maintained in the

intervention group (in patients who had not developed diabetes) after stopping the intervention. 18% of the intervention group and 7% of the control group achieved ≥ 4 of the 5 lifestyle goals at 1 year postintervention ($P = 0.004$).

CONCLUSION

In overweight, middle-aged patients with impaired glucose tolerance, a lifestyle intervention continued to prevent type 2 diabetes for at least 3 years after the program was stopped.

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*See Glossary.

‡Tuomilehto J, Lindström J, Eriksson JG, et al. *N Engl J Med*. 2001;344:1343-50.

Lifestyle intervention vs oral and written information (control) to prevent type 2 diabetes in overweight, middle-aged patients with impaired glucose tolerance‡

Outcome	Follow-up	Incidence per person-y		RRR (95% CI)	NNT (CI)
		Lifestyle intervention	Control		
Diabetes	7 y	4.3%	7.4%	42% (23 to 56)	33 (25 to 58)
	Last 3 y [§]	4.6%	7.2%	38% (2 to 61)	37 (23 to 721)

‡Abbreviations defined in Glossary; RRR, NNT, and CI calculated from hazard ratios in article.

[§]Postintervention period.

COMMENTARY

50% of persons with impaired glucose tolerance will develop type 2 diabetes mellitus over the next 10 years. There is considerable interest among health care providers and policy makers worldwide in avoiding the diagnosis and its long-term adverse effects on morbidity and mortality (1, 2).

The study by Lindström and colleagues, an unplanned extended evaluation of a lifestyle intervention in 522 Finnish patients with impaired glucose tolerance, was done because the 3-year analysis of the Finnish Diabetes Prevention Study showed a 58% relative risk reduction for diabetes (3), which would be clinically useful if sustained. By comparing a group having a median of 20 counseling sessions over 4 years with a control group, the study provided evidence that an intensive lifestyle intervention can reduce risk for type 2 diabetes in high-risk persons. There was an inverse relation between the risk level of the patients and attainment of 5 diet and exercise targets. Few patients who achieved all the targets developed type 2 diabetes.

The few problems with the study were acknowledged by the authors.

It was underpowered because the development of diabetes was a censoring event and patients with diabetes were no longer followed. Patients in the control group were informed of their at-risk status and had an intervention (advice and leaflets) as well as follow-up, so the real effect of the Finnish program may be even more marked for at-risk persons who have not been identified or given advice.

Questions about whether avoiding or delaying the development of diabetes will produce overall benefits in terms of important morbidities or mortality remain open.

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References

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2. Ebrahim S, Beswick A, Burke M, Davey Smith G. *Cochrane Database Syst Rev*. 2006;(4):CD001561.
3. Tuomilehto J, Lindström J, Eriksson JG, et al. *N Engl J Med*. 2001; 344:1343-50.