Costs of a Self-Selected, Health-Promoting Diet Among the Participants of the Finnish Diabetes Prevention Study

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Several studies have shown that lifestyle changes including weight reduction, increased physical activity, and dietary modification are effective in preventing the development of type 2 diabetes (1–4). However, various barriers are known to interfere with the adoption of a healthier lifestyle. One such barrier is diet costs (5). A few studies have explored the relationship between the quality and costs of diets (6–13), and the results are conflicting. Observational studies (6–10) suggest that a healthy diet costs more, whereas intervention studies (11–13) suggest that a healthy diet is not more expensive than a less healthy diet. The aim of this study was to discover whether adopting a diet composed in line with the current nutrition recommendations (14) affects diet costs. The changes in the costs of a self-selected diet among participants in the Finnish Diabetes Prevention Study (DPS) were studied. The diet costs were compared between the control group and intervention group receiving intensive dietary and exercise counseling. Furthermore, the associations between background variables, diet quality determinants, and diet cost were analyzed.

RESEARCH DESIGN AND METHODS

— The DPS was a randomized, controlled trial showing that an intensive lifestyle modification program including dietary and physical exercise counseling is highly effective in decreasing the risk of diabetes in high-risk subjects. The study design, subjects, inclusion and exclusion criteria, and intervention program have been previously described in detail (2,15,16).

Of the DPS participants, 498 subjects (intervention group, $n = 253$; control group, $n = 245$) recorded their food and beverage intakes (3-day food records) at baseline and at a 1-year examination. Individual diet costs were calculated in euros by multiplying the weight of each food item by its unit cost and summing all foods and beverages consumed by each person over the 3-day period at baseline and before the 1-year examination. The food prices used in the calculation were retail prices obtained from two Internet grocery stores and from supermarkets, marketplaces, and Alko (the state alcohol monopoly company) in the summer of 2005. The prices of composite dishes, pastries, and self-baked breads were calculated from the price per kilogram of the recipe ingredients after corrections for waste during preparation and cooking (e.g., peeling of vegetables).

Statistical analyses

Diet costs in the analyses are expressed as mean cost (euros per day per person). ANCOVA was used to test the association between diet costs and various background characteristics. Statistical tests of changes in costs (subtracting the costs at baseline from the costs at the 1-year examination) were adjusted for baseline cost with ANCOVA. Participants were divided into tertiles of selected dietary change determinants, and the linear relationship with diet costs was assessed with ANCOVA. All analyses take into account possible nonconstant variance in the dependent variable, using robust variance estimator. Statistical analyses were performed with the statistics package STATA (version 8.0; STATA, College Station, TX).

RESULTS

— There were no significant differences in baseline characteristics between the intervention and control groups (except for the slightly higher energy proportion of fat and saturated fat in the control group) (15). Individuals in the intervention group reduced the intake of total and saturated fats and increased fiber intake statistically significantly more than those in the control group ($P < 0.001$). They also lost more weight during the first year of intervention ($P < 0.001$).

At baseline, the mean daily diet costs for all study subjects were €4.91 ± 1.94. During the first year of the intervention, the diet costs decreased in both the intervention (€−0.30 ± 1.78, $P = 0.003$) and control (€−0.35 ± 1.85, $P = 0.009$) groups with no difference between the groups. The costs did not differ significantly between the intervention and control groups regarding any variable tested,

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Abbreviations: DPS, Diabetes Prevention Study.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

Table 1—*Mean diet costs (euros per day per person) at baseline and change in costs from baseline to 1-year examination by selected background characteristics and by changes in nutrient intakes from baseline to 1-year examination*

		Baseline costs	Change in costs
n	498		
Sex		4.91 ± 1.92	−0.32 ± 1.81
Men	165	5.68 ± 2.06	−0.63 ± 2.02
Women	333	4.53 ± 1.73	−0.17 ± 1.69
*P**	—	**<0.001**	0.157
Age (years)			
Tertile 1 (*n* = 166)	40.1 to 51.5	5.13 ± 1.76	−0.27 ± 2.06
Tertile 2 (*n* = 166)	51.5 to 61.1	5.01 ± 2.12	−0.28 ± 1.86
Tertile 3 (*n* = 166)	61.1 to 67.9	4.61 ± 1.84	−0.42 ± 1.48
*P**		**0.009**	**0.005**
BMI (kg/m^2)			
Tertile 1 (*n* = 167)	23.5 to 28.7	4.87 ± 1.67	−0.08 ± 1.68
Tertile 2 (*n* = 165)	28.7 to 32.4	5.02 ± 1.92	−0.42 ± 1.58
Tertile 3 (*n* = 166)	32.4 to 50.5	4.85 ± 2.16	−0.46 ± 2.12
*P**	—	0.904	**0.017**
Education			
Lower	335	4.64 ± 1.93	−0.35 ± 1.78
Higher	163	5.47 ± 1.81	−0.28 ± 1.87
*P**	—	**<0.001**	**<0.001**
Marital status			
Married	387	4.89 ± 1.80	−0.30 ± 1.68
Single	111	5.00 ± 2.31	−0.41 ± 2.21
*P**	—	0.630	0.763
ΔFiber (g/1,000 kcal)			
Tertile 1 (*n* = 166)	−15.5 to 0.0	4.65 ± 1.68	−0.01 ± 1.62
Tertile 2 (*n* = 166)	0.0 to 3.4	4.90 ± 2.15	−0.27 ± 1.87
Tertile 3 (*n* = 166)	3.4 to 17.4	5.19 ± 1.89	−0.69 ± 1.88
P†	—	**0.006**	**0.018**
ΔFat (E%)			
Tertile 1 (*n* = 166)	−29.8 to −6.5	4.70 ± 1.65	−0.29 ± 1.65
Tertile 2 (*n* = 166)	−6.5 to 0.6	5.04 ± 1.88	−0.33 ± 1.81
Tertile 3 (*n* = 166)	0.6 to 27.6	5.01 ± 2.20	−0.35 ± 1.97
P†	—	0.143	0.386
ΔSaturated fat (E%)			
Tertile 1 (*n* = 166)	−17.6 to −4.0	4.81 ± 1.76	−0.31 ± 1.77
Tertile 2 (*n* = 166)	−4.0 to −0.1	4.83 ± 1.80	−0.39 ± 1.60
Tertile 3 (*n* = 166)	−0.1 to 20.8	5.11 ± 2.18	−0.28 ± 2.05
P†	—	0.164	0.198

Data are means ± SD, ranges, or *n* unless otherwise indicated. **P* values are for test of equality between indicated background characteristics. †*P* values are for test of trend over nutrient-intakes tertiles. Tests for changes in costs are adjusted for baseline costs. Values in bold indicate statistical significance.

and the two groups were pooled for further analysis.

In the combined group (Table 1), the costs were higher among men compared with women ($P < 0.001$) and among younger compared with older subjects ($P = 0.009$). Age was also associated with the change in costs during the first year of intervention, with the largest reduction ($P = 0.005$) among older subjects. Higher BMI was associated with a decrease in diet costs ($P = 0.017$), and high education was associated both with higher baseline costs ($P < 0.001$) and a smaller reduction in diet costs ($P < 0.001$). The association between change in weight, baseline costs, and change in costs was also tested, but no relationship was found.

To analyze the relationship between dietary composition and costs, the participants were divided into tertiles of fiber, fat, and saturated fat intake at baseline and into tertiles of changes in these dietary determinants. At baseline, the only dietary determinant associated with diet costs was the intake of fiber. The subjects who had the highest fiber intake at baseline also had the lowest diet costs ($P < 0.001$). No significant associations between baseline dietary composition and changes in diet costs during the first year of the intervention were found. When the relationship between dietary changes and diet costs was analyzed, only an increase in dietary fiber density was related to a decrease in dietary costs (€−0.69 ± 1.88, $P = 0.018$) (Table 1).

CONCLUSIONS — The diet costs for the participants of the DPS were analyzed both at baseline and after the first year of the intervention. The analyses indicated that as the quality of diet improved, daily diet costs did not significantly change in obese subjects with impaired glucose tolerance. The results revealed that diet costs do vary according to sex, age, BMI, and education. In our study, the only dietary determinant that was associated with a change in diet cost was fiber density, and the association was inverse: increasing fiber led to a decrease in diet cost. As economic factors may hold the key to dietary change, the results of this study are promising. They indicate that adopting a diet that more closely follows nutrition recommendations will not increase diet costs.

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