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Vegetarian vs. conventional diabetic diet – A 1-year follow-up☆

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ABSTRACT

Objective: Our previous 6-month, randomized study demonstrated the beneficial effect of a vegetarian (V) compared to a conventional diet (C) with similar caloric restriction on cardiovascular risk factors for patients with type 2 diabetes (T2D), namely increased insulin sensitivity, reduced body weight, reduced volume of visceral and subcutaneous fat, decreased LDL-cholesterol and improved oxidative stress markers and chosen adipokines. We conducted post-trial monitoring to determine whether the improved outcomes persisted 1 year after the end of the study.

Methods: 62 subjects with T2D who completed the study were asked to come for a 1-year follow-up to measure weight, waist circumference, HbA1c and blood lipids. No attempts were made to maintain their previously assigned diets.

Results: 44 patients (71%) attended the post-trial monitoring. Hypoglycemic agents were increased by 14% in V and by 26% in C; insulin therapy was introduced in 5% in V and in 13% in C one year after the end of the intervention. Neither weight nor waist circumference changed significantly in either group. HbA1c increased ($p \leq 0.05$) similarly in both groups ($+0.49 \pm 1.04\%$ in V vs. $+0.42 \pm 0.8\%$ in C). Blood lipids did not change in either group.

Conclusion: One year after the end of the intervention, the positive effects of a vegetarian diet on cardiovascular risk factors compared to a conventional diet were partially maintained.

Introduction

The optimal composition of a diet for patients with type 2 diabetes has been a subject of much debate. A vegetarian diet is an interesting alternative different from conventional diabetic diets.

Observational trials showed that prevalence of type 2 diabetes is twice lower in vegetarians compared to common population, even after adjustment for differences in body-

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Abbreviations: CI, confidence interval; C, control group; group × time, interaction between group and time; HbA1c, glycated hemoglobin; MCR, metabolic clearance rate of glucose; T2D, type 2 diabetes; VF, visceral fat; V, vegetarian group.

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mass index (BMI) [1,2]. Randomized clinical trials demonstrated that a vegetarian diet leads to a greater weight loss and reduction in fasting plasma glucose compared to a conventional diabetic diet [3], and also to a greater reduction in HbA1c, LDL-cholesterol and a greater reduction in hypoglycemic agents [4]. Our previous 6-month randomized study had demonstrated that a vegetarian diet more effectively leads to a reduction in insulin resistance, in the volume of both visceral and subcutaneous fat and improvement of markers of oxidative stress and adipokines than a conventional diet [5].

However, successful weight and glycemic control maintenance following initial weight loss intervention is challenging for most of the people. Successful weight maintenance is associated with more initial weight loss, reduction in fasting insulin and insulin resistance [6,7]. This would suggest that the vegetarian participants in our study should be able to maintain their reduced weight and improved glycemic control more than the participants consuming a conventional diet.

The aim of this post-trial monitoring was to follow up our patients at 6 months and 1 year from the end of the intervention.

Material and methods

Intervention

The methods of the 6-months randomized study are described in detail elsewhere [5]. Briefly: 74 subjects with type 2 diabetes treated by oral hypoglycemic agents were randomly assigned into one of two groups within the framework of an open parallel randomized study. The vegetarian group (V, $n = 37$) consumed a lacto-ovo-vegetarian diet, whereas the control group (C, $n = 37$) consumed a conventional diabetic diet. The conventional diabetic diet contained about 45% of energy in the form of carbohydrates, 30% of fats and 25% of proteins. The upper limit for the intake of cholesterol was 200 mg daily. The vegetarian diet contained about 15% more carbohydrates, less fat, and the intake of cholesterol was up to 50 mg a day. The participants in both groups were prescribed an individual caloric restriction of −500 kcal/day based on measurement of resting energy expenditure by indirect calorimetry. The participants were examined at start, after 3 months of diet intervention and the subsequent 3 months of diet + exercise intervention (when diet was combined with aerobic exercise three times a week for one hour at 60% of maximal heart rate).

Follow-up

62 patients (31 from V and 31 from C) who completed the study were invited for a follow-up at 6 months and 1 year after the end of the intervention. 47 patients (76%; 23 from V and 24 from C) attended the 6-month-follow-up, 44 (71%; 21 from V and 23 from C) attended the 1-year follow-up. During one year after the end of the intervention, the patients had discontinued the original diet intervention and they consumed comparable diets. We measured their weight, waist circumference, HbA1c and blood lipids. The patients completed a 3-day dietary record and their physical activity was assessed by a Omron HJ-113 pedometer (Omron, Kyoto, Japan).

The study protocol was approved by the Institutional Ethics Committee.

For statistical analysis, we used a repeated measures ANOVA model with between-subject and within-subject factors and interactions. Within each group, paired comparison t tests were calculated to test whether the changes from the end of the intervention (6 months) to 12 months and from 6 to 18 months were statistically significant.

Results

Diet and physical activity: Parameters of dietary intake and pedometer readings are given in Table 1. We did not observe any differences between the groups in either parameter.

Oral hypoglycemic agents, which were reduced by 43% in V vs. by 5% in C during the intervention, had to be increased by 14% (3/21) in V and by 26% (6/23) in C during 1 year after the end of the intervention. Insulin therapy was started in 5% participants (1/21) in V and in 13% (3/23) in C (Fig. 1A).

Body weight, which was reduced more in V during the intervention (−6.2 ± 5.8 kg vs. −3.2 ± 4.5 kg in C; group x time $p = 0.001$), increased ($p \leq 0.05$) slightly 6 months after the intervention in both groups (+1.7 ± 3.1 kg in V and +1.5 ± 3.1 kg in C; group × time $p \leq 0.05$). One year after the end of the intervention, the trend toward weight gain was not statistically significant in either group (Fig. 1B).

Table 1 – Dietary intake and pedometer readings during the post-trial monitoring.

	Vegetarian group		Control group		p-Value
	6 months post	1 year post	6 months post	1 year post	
Dietary intake					
Caloric intake – kcal day^{-1}	1734 ± 477	1812 ± 438	1786 ± 641	1836 ± 813	0.90
Carbohydrates – g day^{-1}	253 ± 81	241 ± 77	239 ± 93	217 ± 66	0.460
Fats – g day^{-1}	78 ± 31	82 ± 36	81 ± 37	81 ± 35	0.520
Proteins – g day^{-1}	83 ± 23	82 ± 25	86 ± 21	87 ± 4.12	0.18
Fiber intake – g day^{-1}	25 ± 10	23 ± 7	24 ± 10	22 ± 10	0.790
Cholesterol intake – mg day^{-1}	232 ± 114	248 ± 206	288 ± 179	271 ± 222	0.16
Pedometer readings (average steps/day)	5044 ± 2002	4865 ± 1935	4996 ± 2416	4812 ± 1813	0.93

Data are means ± SD. Listed p values are for interaction between group and time. Data were collected 6 months post intervention (month 12) and 1 year post intervention (month 18).