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FEASIBILITY OF, AND SUCCESS IN ADOPTING A LOW-FAT DIET IN CORONARY PATIENTS

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The aim of this study was to evaluate the feasibility of dietary counselling and the predictability of success in reducing fat intake to less than 20% of total energy in patients with symptomatic coronary heart disease. Forty-seven patients with coronary heart disease attended a 2-week in-house cardiac rehabilitation course with the main emphasis on individual dietary counselling by a nutritionist. Patients were followed up at 3 and 6 months. The dietary data were collected by means of 3–7 days food diaries. Mean fat intake decreased from 33.6 ± 6.2% to 24.7 ± 5.5% of total energy intake at 3 months and to 27.0 ± 6.9% ($p < 0.001$) at 6 months. Only 13% of the patients were able to reduce their dietary fat intake as recommended. Thus, reduction of ≥20% was considered a good response, while reduction of < 20% was classified as poor. Forty-seven percent ($n = 22$) of the patients were good and 53% ($n = 25$) poor responders. It was not possible to predict the success rate from the baseline data. After a 2-week intensive counselling period at the rehabilitation centre, half of the coronary patients were able to comply with a low-fat diet at home for 6 months. Long-term compliance requires further investigation.

Key words: coronary heart disease, low-fat diet, bodyweight, compliance.

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INTRODUCTION

Secondary prevention, including proper dietary counselling, is one of the key elements in cardiac rehabilitation. Although beneficial changes have occurred since the 1970s, the Finnish diet is still high in saturated fat and low in vegetables (1). Patients with symptomatic coronary artery disease are advised to reduce the amount of fat in their diet and to eat polyunsaturated rather than saturated fatty acids. Standard dietary counselling may, however, be ineffective, even in patients with hypercholesterolaemia (2). Thus, more intensive counselling is called for. Considerable reduction of dietary fat intake (to 10–27% of total energy intake) has been shown, in a number of studies, to slow down the progression of coronary atherosclerosis, especially when combined with vigorous exercise and other ways of reducing risk factors (3–6). In these studies, the subjects have usually been selected and highly motivated. However, a large number of coronary patients recovering after acute myocardial infarction or coronary revascularization need more intensive counselling than is currently offered at hospitals. Advice given to patients must be generally applicable and feasible in everyday life and acceptable to patients undergoing a very stressful life experience.

The WHO Study Group has recommended 30% of total energy intake as an upper limit of fat intake but in populations with a high fat intake further benefits would be expected by reducing fat intake towards 15% of total energy (7). Such a low level is, however, difficult to achieve in societies which are used to consuming large amounts of meat and dairy products. Schuler et al. used a diet with a fat content of 20% of total energy intake (8). Therefore, we studied the feasibility of, and the predictability of the success in adopting, a diet with a fat content of < 20% of the total energy intake in a group of ambulatory coronary patients. Intensive dietary counselling was given during a 2-week period at a rehabilitation centre. The main aim was to study how well the patients complied with the dietary instructions, what kind of difficulties they faced, and whether it was possible to predict from baseline data who would succeed in achieving the dietary goals under normal conditions without any special supply of low-fat foods. The patients were followed up for 6 months after the counselling period.

PATIENTS AND METHODS

Patients

The initial study group consisted of 54 subjects (46 men and 8 women, mean age 54.3 ± 8.1 years, age range 34–70 years) who had been admitted to the Turku University Hospital for coronary angiography indicated by anginal symptoms or ischaemic left ventricular dysfunction. One patient died, two patients had cardiac complications during the study and four patients did not take part in the follow-up. Thus, the final number of subjects was 47 (39 men and 8 women). Of these patients, 23 had suffered acute myocardial infarction 2 months to 5 years earlier and 9 had undergone percutaneous transluminal coronary angioplasty 1 month to 4 years earlier. Only one patient had undergone coronary artery bypass surgery. When the study started, 14 patients belonged to New York Heart Association Functional Class I, 26 to Class II and 7 to Class III (9). Of the 47 patients, 18 were treated for hypertension, 15 had antilipidaemic medication and three had diabetes.

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Table I. *Daily intake of total energy and dietary fats during the follow-up*

Parameter	Baseline Mean ± SD $n = 47$	3 months Mean ± SD $n = 45$	p^1	6 months Mean ± SD $n = 47$	p^2
Total energy (kcal)	1727 ± 466	1598 ± 438	NS	1640 ± 395	NS
Total fat					
E%[3]	33.6 ± 6.2	24.7 ± 5.5	0.0001	27.0 ± 6.9	0.0001
g	63.9 ± 21.1	43.6 ± 15.8	0.0001	48.8 ± 16.6	0.0001
SAFA[4]					
E%	12.3 ± 4.3	8.2 ± 2.4	0.0001	9.4 ± 3.5	0.0001
g	23.6 ± 11.5	14.6 ± 6.2	0.0001	16.7 ± 6.7	0.0001
MUFA[5]					
E%	11.9 ± 3.1	8.6 ± 2.0	0.0001	9.3 ± 2.6	0.0001
g	22.5 ± 8.0	15.2 ± 5.5	0.0001	16.9 ± 6.4	0.0001
PUFA[6]					
E%	6.1 ± 1.7	5.1 ± 1.5	0.0005	5.3 ± 1.4	0.003
g	11.6 ± 4.6	9.0 ± 3.7	0.0009	9.7 ± 3.7	0.002
P:S[7]	0.56 ± 0.24	0.65 ± 0.21	0.032	0.64 ± 0.24	0.037
Cholesterol (mg)	242 ± 113	165 ± 69	0.0001	187 ± 83	0.0001

p^1 Significance of change from baseline to 3 months.
p^2 Significance of change from baseline to 6 months.
[3] Percentage of total energy intake.
[4] Saturated fatty acids.
[5] Monounsaturated fatty acids.
[6] Polyunsaturated fatty acids.
[7] Polyunsaturated and saturated fatty acid ratio.

Rehabilitation programme and follow-up

The patients attended a 2-week in-house cardiac rehabilitation course at the Rehabilitation Centre of the Social Insurance Institution in Turku in groups of 6 patients. The rehabilitation programme consisted of group and individual guidance concerning a risk-reducing healthy lifestyle. A physician examined and interviewed the patients at the beginning and end of the 2-week period and led a group discussion about coronary disease and its risk factors. A social worker and a psychologist met the patients individually and in groups and discussed sociopsychological problems and adaptation to the illness. During the 2-week period the patients had six exercise training or eight relaxation sessions. In addition, the patients had group discussions about adaptation to daily living, hobbies and physical exercise. The main emphasis was, however, on the dietary advice given by a nutritionist, as opposed to the general rehabilitation courses which are more concerned with physical training.

The patients had their first follow-up session at the Rehabilitation Centre 3 months after the rehabilitation course, when they met the counselling team in order to brush up instructions and exchange experiences; at this time they were encouraged to continue the diet. The second follow-up session was carried out 6 months after baseline at the outpatient clinic of the Medical Department of the Turku University Hospital.

Dietary counselling

The course included two daily group sessions of 40–120 min duration and food preparation demonstrations once a week. In addition, individual dietary counselling based on the patients' food diaries and food preferences was given twice during the in-house period. The main goal was to reduce the total fat content of the diet to 20% of total energy intake, the figure used by Schuler et al. (8). Additional goals were: to promote unsaturated fats instead of saturated fats; to increase the use of complex carbohydrates; and to maintain the level of dietary protein. The amount of animal fat was restricted and soft vegetable margarine and oil were recommended. The patients were advised to use low-fat milk products instead of full-fat milk or cheese. They were encouraged to eat more cereals, vegetables and fruits than before. The emphasis was placed on choosing low-fat food items and food preparation methods consistent with a low-fat eating style. Foods available at local stores were recommended. The patients were taught and advised to read product labels. The percentage of fat in the diet was demonstrated with the nutrient calculation computer program "RuokaMittari" (Finnish translation of the Dutch "Eatmeter" computer program). The patients were given calculations of recommended diet. They also received lists of the fat and fibre contents of different foods. Recommended daily portions of the following food groups were given: high-fibre bread, 6–9 slices; porridge, 1–2 plates; potatoes and vegetables, as much as possible; fruits and berries, 2–4 pieces or 2–4 dl; non- or low-fat dairy products, 2–4 dl; low-fat meat, 30–100 g; and table fats, 1–2 tablespoonfuls. Rice and pasta were recommended. Because this diet differed a lot from the usual Finnish diet, the recommendations were accompanied by detailed instructions. The meals at the Rehabilitation Centre mainly conformed with a lacto-vegetarian diet and the recipes were given to the patients. Although spouses were invited to take part in the counselling sessions, none of them attended.

Dietary assessment

The subjects' dietary intake was monitored before and 3 and 6 months after the counselling period by means of food diaries. Due to problems in recruitment before the rehabilitation period, not all patients had sufficient time to keep the diary for a whole week and so the minimum instructed time was 3 days, including one Saturday or Sunday. The number of days for which diaries were kept were 5.2 ± 1.9 at baseline, 6.6 ± 1.0 at 3 months and 6.7 ± 0.9 at 6 months. Trade names of foodstuffs were recorded, and portion sizes were estimated using household measures. Each food diary was reviewed by a nutritionist, together with the patient, to ensure the completeness and accuracy of the data. The data were transferred to a PC database. Nutrient composition was analysed using the Micro-Nutrica software designed for nutrient calculation (10, 11).

To evaluate the validity of food record data, basal metabolic rate (BMR) was calculated using the formula suggested in the FAO/WHO/UNU report (12). The ratio of energy intake (EI) to BMR estimates the truthfulness of reporting. The cut-off level of EI:BMR indicating under-reporting was averaged to be 1.47 (13).

Patients' opinions concerning the acceptability of the instructed diet and the difficulties of following it were asked for at baseline and 6 months later using a questionnaire designed for the study. Body Mass Index (BMI) was calculated as weight (kg) divided by height (m) squared.

Statistical analysis

The SAS® Program Package, Version 6 (14), was used for all statistical

Table II. *Characteristics of the patients in group I (good compliers,* n = *22) and group II (poor compliers,* n = *25)*

Characteristic	Group I $n = 22$	Group II $n = 25$	p
Men/women	17/5	22/3	NS
Age (years)	55.0 ± 8.2	54.5 ± 8.6	NS
Basic education			
More than primary level (%)	18	28	NS
Some occupational education (%)	32	64	0.028
Myocardial infarction (%)	55	44	NS
Weight (kg)	79.5 ± 10.2	84.0 ± 11.2	NS
BMI (kg/m^2)	27.8 ± 4.4	28.7 ± 3.4	NS
Angiography			
Single vessel disease (%)	59	28	
Double vessel disease (%)	27	48	NS
Triple vessel disease (%)	14	24	

analyses. The results are given as means ± SD for continuous variables and as percentages for categorical variables. Pearson's χ^2 test was used for between-group comparisons for categorical variables. Student's t-test (two-tailed) was used in pairwise comparisons between groups for numerical variables. Values of $p < 0.05$ were considered statistically significant.

RESULTS

Dietary fat intake

At baseline, the mean intake of dietary fat was 33.6 ± 6.2% of total energy intake. It decreased by 26.3% ($p < 0.001$) at 3-month follow-up and 19.5% ($p < 0.001$) at 6-month follow-up compared with the baseline value (Table I).

Mean intake of saturated fatty acids (SAFA), monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA) decreased during follow-up; the intake of SAFA had decreased 36% at 3-month follow-up ($p < 0.001$) and 29% at 6-month follow-up ($p < 0.001$). Correspondingly, the intake of MUFA decreased 33% ($p < 0.001$) and 25% ($p < 0.001$) and the intake of PUFA decreased 24% ($p < 0.001$) and 16% ($p = 0.002$). The polyunsaturated to saturated fatty acid (P:S) ratio increased by 17% ($p = 0.032$) at 3 months and by 14%

Table III. *Daily intake of energy and macronutrients during the follow-up for patients with good compliance (Group I,* n = *22) and poor compliance (Group II,* n = *25)*

Parameter	Group	Baseline Mean ± SD	p^1	3 months[a] Mean ± SD	p^2	p^3	6 months Mean ± SD	p^4	p^5
Energy (kcal)	I	1607 ± 483		1560 ± 414	NS		1617 ± 435	NS	
	II	1832 ± 433	NS	1628 ± 464	NS	NS	1660 ± 364	NS	NS
Fat (E%)[6]	I	34.7 ± 6.9		21.2 ± 4.7	0.0001		21.8 ± 5.0	0.0001	
	II	32.6 ± 5.3	NS	27.5 ± 4.3	0.0001	0.0001	31.7 ± 4.6	NS	0.0001
SAFA[7] (E%)	I	12.7 ± 5.4		6.8 ± 1.9	0.0001		7.3 ± 2.5	0.0001	
	II	11.9 ± 3.0	NS	9.4 ± 2.2	0.0004	0.002	11.3 ± 3.1	NS	0.0001
MUFA[8] (E%)	I	12.4 ± 3.5		7.2 ± 1.3	0.0001		7.5 ± 2.0	0.0001	
	II	11.5 ± 2.8	NS	9.8 ± 1.7	0.0006	0.0001	10.9 ± 2.1	NS	0.0001
PUFA[9] (E%)	I	6.1 ± 2.3		4.3 ± 2.0	0.0009		4.6 ± 1.1	0.0002	
	II	6.1 ± 1.2	NS	5.7 ± 1.5	NS	0.005	6.0 ± 1.4	NS	0.003
P:S[10]	I	0.57 ± 0.27		0.67 ± 0.16	NS		0.71 ± 0.26	0.029	
	II	0.55 ± 0.21	NS	0.64 ± 0.25	NS	NS	0.57 ± 0.19	NS	0.08
Cholesterol (mg)	I	219 ± 113		160 ± 80	0.027		156 ± 75	0.002	
	II	263 ± 111	NS	169 ± 60	0.0002	NS	213 ± 82	0.035	NS
Carbohydrate (E%)	I	44.8 ± 8.4		56.8 ± 7.6	0.0001		56.1 ± 9.0	0.0001	
	II	45.5 ± 7.3	NS	51.6 ± 5.8	0.0001	0.002	47.2 ± 6.3	NS	0.0001
Protein (E%)	I	18.7 ± 3.9		19.8 ± 3.7	NS		19.1 ± 3.7	NS	
	II	18.1 ± 4.1	NS	18.0 ± 2.0	NS	NS	17.8 ± 3.2	NS	NS

[a] $n = 20$ in Group I at 3 months.
p^1 Significance for the difference between the groups at baseline.
p^2 Significance for the difference in change within the group from baseline to 3 months.
p^3 Significance for the difference in change between the groups from baseline to 3 months.
p^4 Significance for the difference in change within the group from baseline to 6 months.
p^5 Significance for the difference in change between the groups from baseline to 6 months.
[6] Percentage of total energy intake.
[7] Saturated fatty acids.
[8] Monounsaturated fatty acids.
[9] Polyunsaturated fatty acids.
[10] Polyunsaturated and saturated fatty acid ratio.

Table IV. *Daily intake of milk, cheese, bread spreads, bread and other grain products during the follow-up for patients with good compliance (Group I,* n = *22) and poor compliance (Group II,* n = *25)*

Product	Group	Baseline Mean ± SD	p^1	3 months[a] Mean ± SD	p^2	p^3	6 months Mean ± SD	p^4	p^5
Milk (g)									
High-fat (>2.5%)	I	54 ± 192		0 ± 1	NS		0 ± 0	NS	
	II	5 ± 17	NS	1 ± 4	NS	NS	7 ± 27	NS	NS
Medium-fat (1–2.5%)	I	148 ± 153		103 ± 156	NS		93 ± 90	NS	
	II	276 ± 249	0.043	154 ± 149	0.013	NS	166 ± 136	0.032	NS
Low-fat (<1%)	I	223 ± 236		390 ± 241	0.020		371 ± 230	0.008	
	II	153 ± 190	NS	247 ± 260	NS	NS	207 ± 220	NS	NS
Cheese (g)									
High-fat (>26%)	I	2 ± 4		4 ± 9	NS		2 ± 4	NS	
	II	8 ± 14	NS	2 ± 5	0.038	NS	6 ± 11	NS	NS
Medium-fat (14–26%)	I	4 ± 6		1 ± 3	NS		1 ± 3	0.029	
	II	10 ± 12	0.04	9 ± 12	NS	NS	6 ± 11	NS	NS
Low-fat (<14%)	I	15 ± 45		19 ± 27	0.036		23 ± 38	NS	
	II	2 ± 6	NS	14 ± 17	0.002	NS	12 ± 16	0.013	NS
Spreads (g)									
Butter	I	8 ± 17		1 ± 2	0.039		2 ± 6	0.022	
	II	5 ± 6	NS	2 ± 3	0.009	NS	3 ± 4	NS	NS
Butter–vegetable oil mixture (40% fat)	I	0 ± 2		0 ± 0	NS		1 ± 3	NS	
	II	2 ± 6	NS	8 ± 4	NS	NS	1 ± 3	NS	NS
Vegetable margarine (80% fat)	I	9 ± 11		3 ± 4	0.007		3 ± 4	0.007	
	II	11 ± 10	NS	8 ± 11	NS	NS	10 ± 10	NS	NS
Soft margarine (40% fat)	I	1 ± 3		0 ± 1	NS		0 ± 0	NS	
	II	2 ± 6	NS	1 ± 3	NS	NS	3 ± 2	NS	NS
Bread and grain products									
	I	181 ± 59		233 ± 68	0.004		235 ± 79	0.004	
	II	216 ± 71	NS	224 ± 80	NS	NS	201 ± 58	NS	0.008

[a] $n = 20$ in Group I at 3 months.
p^1 Significance for the difference between the groups at baseline.
p^2 Significance for the difference in change within the group from baseline to 3 months.
p^3 Significance for the difference in change between the groups from baseline to 3 months.
p^4 Significance for the difference in change within the group from baseline to 6 months.
p^5 Significance for the difference in change between the groups from baseline to 6 months.

($p = 0.037$) at 6 months from the baseline value of 0.56 ± 0.24. Dietary cholesterol intake decreased by 32% and 23% ($p < 0.001$), respectively from the baseline value of 242 ± 113 mg/day. Men and women differed only in the baseline intake of MUFA (men 11.3 ± 2.7%, women 14.8 ± 3.8% of total energy intake, $p = 0.004$) and in the P:S ratio at 6 months (men 0.60 ± 0.21, women 0.80 ± 0.29, $p = 0.029$).

At baseline, 70% of the patients consumed a diet with a fat content of >30% of total energy and no-one consumed a diet with a fat content of <20% of total energy intake. At 3 and 6 months, 20% and 13% of patients, respectively had reduced the amount of dietary fat to the recommended level, while 22% and 36% of patients, respectively were still consuming a diet with a fat content of >30% of total energy intake.

Weight decreased from 82.3 ± 11.0 kg at baseline by 2.3 ± 2.3 kg ($p = 0.0001$) at 3-month follow-up and by 2.2 ± 4.2 kg ($p = 0.003$) at 6-month follow-up. BMI decreased from 28.3 ± 3.9 kg/m^2 at baseline by 0.79 ± 0.81 kg/m^2 ($p = 0.0001$) at 3 months and by 0.74 ± 1.4 kg/m^2 ($p = 0.003$) at 6 months.

Good and poor responders

Because only a minority of patients were able to reduce the amount of dietary fat down to the recommended level, the decrease of energy derived from fat by >20% from the baseline level at 6 months was considered a good result. Thus, the patients were divided into two groups: good responders (Group I) consisting of 22 patients (17 male, 5 female); and poor responders (Group II) consisting of 25 patients (22 male, 3 female). The only difference between the baseline characteristics was in terms of occupational education (Group I 32% vs. Group II 64%, $p = 0.028$) (Table II).

The baseline levels of energy-yielding nutrients did not differ between the two groups (Table III). The intake of fats had decreased significantly in both groups ($p < 0.001$; p = NS for differences between the groups) at 3-month follow-up. In Group I, the mean values were close to 20% of total energy intake at both 3 and 6 months. In Group II, energy intake from fat decreased at first only to return almost to the baseline level. The intake of SAFA, MUFA and PUFA decreased significantly in both groups during the first 3 months. At 6 months all levels were significantly lower than at baseline in Group I but not in Group II. All changes from baseline to 6 months were significantly different between the groups. At baseline, the P:S ratio did not differ between the groups. In Group I, the ratio increased significantly from baseline to 6 months ($p = 0.03$), and

the difference between the groups was significant at 6 months ($p = 0.05$). The intake of dietary cholesterol decreased significantly in both groups, and there were no differences between the groups. Carbohydrate intake increased significantly only in Group I, from 179 ± 71 g/day to 225 ± 78 g/day ($p < 0.001$). Protein intake remained at the original level in both groups during follow-up.

Dairy products, spreads, bread and other grain products

At baseline, the subjects in Group II used more medium-fat milk and cheese products than the subjects in Group I ($p = 0.04$) (Table IV). During follow-up, the subjects in both groups changed from fatty or medium-fat milk and cheese products to low-fat products and reduced the use of butter. The subjects in Group I also reduced the amount of vegetable margarine. The differences between the groups were not significant for these changes. The patients in group I increased their intake of bread and other grain products significantly, while the intake in group II did not change ($p = 0.008$).

Due to the apparently low values of total energy intake and non-significant changes during follow-up, EI:BMR was calculated and was found to be 0.95 ± 0.30 and 1.04 ± 0.27 (p = NS) at baseline, 0.94 ± 0.25 and 0.93 ± 0.29 (p = NS) at 3 months and 1.00 ± 0.28 and 0.95 ± 0.25 (p = NS) at 6 months in Groups I and II, respectively. Judged by the 1.47 cut-off point, only one subject at baseline or at 3-month follow-up and three subjects at 6-month follow-up did not under-report.

Bodyweight and BMI

Bodyweight tended to be lower in Group I than in Group II at baseline (79.3 ± 10.2 vs 84.9 ± 11.2 kg, $p = 0.08$; BMI 27.8 ± 4.4 vs 28.7 ± 3.4 kg/m^2, p = NS). Weight decreased in both groups significantly by 3 months (2.6 ± 2.0 kg in Group I, $p = 0.0001$ and 1.9 ± 2.5 kg in Group II, $p = 0.001$, p = NS between the groups), but only in Group I significantly at 6 month follow-up (3.1 ± 4.5 kg, $p = 0.007$, vs 1.3 ± 3.8 kg, p = NS, p = NS between the groups).

Subjective opinions

The patients' opinions of possible difficulties or their own estimates of future success did not differ between the two groups at baseline. A total of 42% of the patients (40% in Group I, 44% in Group II) expected it to be easy to follow the instructed diet and, during follow-up, 29% (37% in Group II, 23% in Group II) of patients considered themselves to have succeeded. At baseline no-one expected it to be impossible to adhere to the diet at home, and later no-one felt they had totally failed to follow the instructed diet at home. The patients expected, and actually experienced, more difficulties in eating out. Only a few patients found the instructed diet expensive (1 patient at baseline, 2 patients at 6 months) or reported that the person who prepared the food was not willing to carry out the recommended changes (3 patients at 6 months). Some patients found food with a low fat content to be tasteless (2 patients at baseline, 7 patients at 6 months).

DISCUSSION

This study shows that coronary patients are able to change their dietary habits and to considerably reduce the intake of dietary fat after intensive counselling. The overall fat intake at 6-month follow-up had been reduced by about a quarter from baseline. The desired goal of a dietary fat content of < 20% of total energy intake was, however, achieved only by a limited number of subjects.

It is a well-known fact that subjects tend to under-report their dietary data (13) and this was evident in our study. Both men and women and both overweight and normal-weight subjects under-reported. There may be several reasons for this: either there is genuine under-reporting or else subjects change their diet during the days of observation. Especially in studies aimed at reducing dietary fat and energy, subjects may eat differently on days with and without reporting. In our study, EI:BMR was very low in both groups of patients and did not change significantly during the study. The changes in body weight were, however, in line with the changes in energy intake from fat.

The main aim of this study was to find out if Finnish coronary patients can change their dietary habits after a 2-week in-house counselling period and comply with the guidelines using conventional foods available at local stores without any special supply of low-fat foodstuffs. Most participants had had symptoms of coronary heart disease for many years and half of the patients had suffered myocardial infarction. Thus, they had already received general dietary counselling, and the majority of them actually admitted to be on some kind of diet when the study started. Therefore, it is surprising that their fat intake at baseline was quite similar to that reported in the general population of Finland (1) and that the intake of saturated fat was so high. Finnish food still typically contains a high proportion of milk fat and although the consumption of fatty milk and butter has decreased considerably during the last decade, the consumption of cheese has increased (1). This explains the high intake of saturated fatty acids. It is, however, possible that the subjects' diet had previously contained even more fat than at baseline. The intake of dietary cholesterol at baseline was somewhat lower than in the Finnish population survey (1) and it decreased further during the study period.

The diet was best complied with for the first 3 months: all but 5 patients were able to reduce the amount of fat in their diet. However, at 6 months, 13 patients consumed even more fat than they did at baseline. Many patients in Group II initially decreased their intake of fatty foods but did not learn to choose more carbohydrates instead of fats. Therefore, it may have been more difficult for them to proceed with the reduced fat intake. In every intervention study there are people who respond well and those who initially try to follow the instructions, but lose their motivation later on (15). Intervention studies in non-controlled circumstances generally report lower responsiveness and greater

variability in endpoint responses (15–17) than studies conducted in controlled research settings with special food supplies (4, 18). In controlled settings, the compliance may be >90% (19).

One major point to consider with this kind of rehabilitation course is the need to put more emphasis on supporting the behavioural changes. Our rehabilitation course provided basic knowledge concerning how to choose low-fat foods but the support given by our psychologist was not as intensive as it could have been. Continuous support during follow-up would have been needed to improve long-term compliance. Eating is a social activity and is related to the social environment. The importance of including patients' spouses in counselling sessions is important; although this was permitted, it failed in practice.

Long-term adherence to dietary changes is always a problem and the spouse's support can be very important (20). This was the case in the present study where the majority of the patients were men and their wives were usually preparing the meals. In our study, the wives were seldom reported to be unwilling to prepare low-fat food. Nevertheless, none of them attended the dietary counselling sessions, either as a result of work commitments or the long journey to the Rehabilitation Centre. The number of female patients in this study was low. They did not comply with the dietary recommendations any better than the men as far as fat intake was concerned, but they did improve the quality of their fat intake, because their P:S ratio increased more than it did for the men. It may, however, be much easier for highly motivated women than men to maintain low-fat consumption over a long period of time, as has been shown in women with a high risk of breast cancer (21). In that study, the participants in the intervention group adhered to the low-fat diet with a total fat intake close to 20% of total energy intake for up to 2 years, but the programme consisted of comprehensive dietary and behavioural counselling in small groups meeting at first weekly and later once a month. In this setting, psychological support from the other participants and the group leaders was a prerequisite for positive long-term results.

One of our aims was to try to determine basic characteristics of the patients who did or did not succeed in keeping their fat consumption in line with the instructed diet. The patients who succeeded in dieting lost slightly more weight during follow-up than the patients who failed. The groups did not differ in terms of their dietary intake of macronutrients at baseline. Education or occupational status did not influence the degree of compliance. Eating difficulties during working hours did not explain the differences in adherence to the diet. The patients' opinions of possible difficulties or their own estimates of future success did not differ between the groups. Few patients reported difficulties in following the advised diet at home but more patients had difficulties away from home, as was expected (22). The patients did not consider shopping for the recommended food to be difficult or expensive and neither did they consider the taste of the food to be such an important factor as reported in other studies (22, 23).

Assessing the dietary intake of individuals in uncontrolled circumstances may also be problematic. Biased reporting may exist, especially in intervention studies (24). Our aim was to use a 7-day food diary, but this was not possible for all patients at baseline. Thus, the results are possibly more reliable during follow-up than at baseline. However, concerning energy and macronutrients, 4–8 days are enough to ensure a high correlation ($r \geq 0.9$) in the adult population (25). In addition, the changes in weight are in accordance with the reported changes in dietary fat intake, which supports the reliability of the dietary data.

CONCLUSIONS

Intensive dietary counselling is effective in considerably reducing the mean dietary fat intake, especially in terms of saturated fats and cholesterol, but only a minority of patients can reduce the fat intake to 20% of total energy intake. Baseline dietary characteristics concerning macronutrients do not predict success with dietary changes. The study suggests that a 2-week period of intensive dietary counselling at a rehabilitation centre may lead to short-term adherence to a low-fat diet in some coronary patients. Long-term results of this kind of intervention need further investigation.

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