

Detection of Food Consumption in Type 2 Diabetic Patients with a Previous Cardiovascular Event before and after an Education Program: A “Pilot Study”

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Abstract

Background and aims: People with diabetes need to be educated in the self-management of the disease at the time of diagnosis and in follow-up to best benefit from what they learn. Education is most effective when conducted with small groups of patients by a professional team.

The aim of the study is the evaluation of nutritional education on how to increase the Mediterranean diet knowledge and the improvements on food choices.

Methods and Results: The sample group consisted of 6 patients of both sexes, between 50 and 70 years of age, suffering from diabetes mellitus type 2 with a previous myocardial infarction. They had been subjected to the Burke Method of the “dietary history”, performed by an interview.

Subsequently, they attended 7 on nutrition and diabetes education; then, the initial “dietary history” checked for changes and improvements.

Data we obtained allow us to make a number of considerations: diets were, initially, greatly imbalanced and irrational, because very low in carbohydrates and too high in protein, and especially in fats: in regard to lipids, we are found an excess of saturated fatty acids; the lipid profile is further worsened by the excessive intake of cholesterol and the inadequate fiber intake.

At the end of lessons, we observed a slight reduction of proteins and lipids, and this shows how the subjects have tried to improve their diet as a result of the given suggestions.

Conclusion: The rebalancing of the food ration gives a beneficial influence, especially when integrated with physical activity. This project is a preliminary study of education for diabetic patients, aimed to improve the living conditions of patients suffering from diabetes.

The results obtained, on balance positive, suggest that the arguments and methods of detection adopted can be applied successfully in future broader consistency projects.

Keywords: Diabetes; Cardiovascular Diseases; Type 2 Diabetes

Introduction

Diabetes is one of the risk factors that influence the occurrence of cardiovascular diseases, so we should prevent these diseases through a healthy diet, especially focus the attention to the selection and the preparation of foods [1].

The first study that has investigated the correlation between cardiovascular events and lifestyle was the “Seven Country Study” conducted in Minnesota by Ancel Keys and collaborators between 1958 - 1970, in which men between 40 and 59 years of age from 7 different countries (Yugoslavia, the Netherlands, Japan, Italy, Greece, USA, Finland) were examined. The first intention of this study was to demonstrate that the different frequency of heart attacks and strokes among different countries could be linked to different lifestyles and, in particular, to the composition of diet.

The results showed that there was a much lower rate of coronary heart disease and cerebrovascular disease in Greece and Italy, more faithful to diet, especially low in saturated fat and rich in unsaturated fats (olive oil), compared to other countries, such as the USA and Finland [2].

This first study cast light on the importance of nutrition and the role of individual nutrients and was subsequently amplified and confirmed by multiple studies that have been conducted from the 1980 to today. Mediterranean diet is associated, in general, to an average reduction of 30% in cardiovascular risk. Several control studies have shown a positive correlation between Mediterranean diet and reduction of body weight, systolic and diastolic blood pressure, fasting glucose, insulin resistance, total cholesterol, coronary heart disease, tissue oxidation, inflammatory markers and mortality from heart disease [3,4].

Mediterranean Diet follows as a general principle the “choice” of the food rather than the overall caloric intake. An adult man should takes every day 1600 - 2300 kcal on average, depending on personal needs, of which 55% from carbohydrates (cereals, legumes, fruits, vegetables, pasta, bread, rice), possibly complex, with a low glycemic index, 30% from lipids (oil, butter, nuts, animal fats) and 15% from proteins (milk and dairy products, meat, fish, legumes, eggs).

The most important principles of Mediterranean diet are based on a greater consumption of vegetable rather than animal proteins on a reduction of saturated fats (eg. Butter) in favour of unsaturated (eg. olive oil), a high intake of dietary fiber (vegetables and fruits), on a high consumption of fish and legumes and a moderate alcohol consumption [5].

Weight loss for overweight adults (BMI 25.0 - 29.9 kg/m²) or obese (BMI ≥ 30 kg/m²) is recommended; the primary approach for achieving and maintaining weight loss is the lifestyle change, that includes a reducing caloric intake and an increase of physical activity [6]. A moderate reduction of caloric intake (300 - 500 kcal/day) and a moderate increase in energy expenditure (200 - 300 kcal/day) allow a slow but steady weight loss. People with diabetes should receive nutritional counseling: education in small groups and/or in a setting with an individualized educational program has proven lots of benefits. At the moment, there is no evidence to suggest the use of low-carbohydrate diets (with a restriction to below 130 g/day) in people with diabetes.

Both the quantity and quality of carbohydrate foods can affect the glycemic response.

Foods containing mostly simple sugars, if included in the nutritional plan, should replace other carbohydrates; if added, they should be handled by increasing the bolus insulin or with other hypoglycemic agents. Excessive habitual consumption of sucrose and other simple sugars can lead to weight gain, insulin resistance and hypertriglyceridemia.

The glycemic index (GI) must be considered in the choice of food. A low-GI diet may, in fact, lead to an improvement in glycemic control, also reducing the risk of hypoglycemia.

In regard to proteins, in patients without evidence of nephropathy, they should provide about the 15% of total daily energy; while, in regard to the lipid intake, it's important to remember that the daily intake should not exceed the 30% of total energy, with cholesterol quantity not exceeding 300 mg/day, reducing to 200 mg/day in the case of high plasma values. Moreover, saturated fatty acids should be less than the 10%, by reducing 8% in the case of high plasma values of LDL-cholesterol fraction.

It is important the intake of at least 2 servings of fish a week to provide an adequate intake of polyunsaturated fatty acids [7].

As mentioned previously, the performance of an adequate level of physical activity to promote weight loss and improve glycemetic control is important. Cohort studies have confirmed that physical activity is associated to a significant reduction of cardiovascular mortality and also improves the quality of life, reducing insulin need in patients with type 2 diabetes.

In type 2 diabetes, exercise against resistance, associated with moderate weight loss, has proven effective in improving glycemetic levels and some parameters of the metabolic syndrome and in preventing the loss of muscle mass.

In diabetic subjects at least 150 minutes/week of moderate-intensity aerobic physical activity (50 - 70% of maximum heart rate) and/or 90 minutes/week of intense exercise (> 70% of maximum heart rate) are recommended at least. Physical activity must be distributed on at least 3 days/week and there must be no more than 2 consecutive days without activity.

The systematic surveys of food and food consumption habits are a key element of knowledge for research in applied nutrition programs and food policy.

There are many techniques of detection and the methodology chosen must, therefore, be appropriate to the specific purposes to be achieved. The essential moments of each detection are represented by the group sampling on which it operates, by the determination of consumption and the processing and presentation of data [8]. Food consumption can be evaluated by simple estimates (food availability) or memory or actual measurement at individual, family and community level.

In this study we were evaluated the food consumption of 6 subjects with type 2 diabetes and previous cardiovascular event, at the beginning and at the end of a nutrition and diabetes education, made in seven group meetings.

Methods

We used the Burke Method of the “dietary history”, which considers both the quality and quantity of the diet. The evaluation is performed by an interview, during in which a nutritionist had the task of recording the quantities of each foods and beverages in the application form, as well as the frequency with which they are consumed (daily, weekly, etc.) [9]. To be able to trace as closely as possible the amount consumed, when the respondent is not able to give reliable answers, a photographic atlanta was used, which was developed at the former Institute of Food Science, University of Perugia. It also outlines the various portions of the main food and/or Italian dishes and the exact weight of each serving.

Results

Data collected at the beginning and at the end of the study, shows that the whole (100%) of the sample addressed their own choices to meat, cereals, vegetables and greens, fruit, pizza, oils, cheeses, eggs, fish and alcoholic beverages, followed by legumes consumed by the 87% of the sample. They did never consume offal, sandwiches, condiments animal fats, sweeteners and mealy fruit. At baseline, the 100% of the sample consumed milk and yogurt, while only 66% at the end of the study continued to consume them. Furthermore, it is evident a reduction of sweets (from 87% to 66% of the consumption).

At the end of the study, only the 17% consumed sugary drinks.

Table 1 shows the mean, standard deviation, and percentiles of daily food consumption at the beginning of the study. As we can see, the more consumed foods daily by the subjects appear to be fruits, vegetables, cereals, meat, milk and alcoholic beverages, while the less consumed are legumes, eggs, potatoes and sugar. Poor even the use of ready meals, the consumption of sweeteners, sandwiches, meat offal, fat from animal seasoning (outside extra virgin olive oil) and mealy fruit.

Food	Percentiles							Mean	SD
	0°	10°	25°	50°	75°	90°	100°		
Milk	0	0	25	125	201	259	300	128	119,77
Cheeses	20	24	35	65	94	102	104	64	35,57
Total Meat	55	61	84	171	216	237	255	156,3	83,63
Fresh “”””	25	34	60	131	159	174	185	113,08	65,87
Offal “””””	0	0	0	0	0	0	0	0	0
Preserved “”””	20	22	26	31	53	76	92	43,21	27,58
Eggs	8	8	10	15	17	18	20	14,17	4,79
Total Fish	28	33	39	50	59	87	115	56,83	30,89
Fresh “””””	0	19	39	50	59	87	115	52,17	37,52
Frozen “””””	0	0	0	0	0	14	28	4,67	11,43
Preserved “”””	0	0	0	0	0	0	0	0	0
Total Fats	15	20	25	30	42	47	50	32,5	13,32
E.V. Oil	15	20	25	30	42	47	50	32,5	13,32
Total Cereals	104	124	145	157	214	261	292	180,67	68,31
Bread	57	65	74	102	144	175	200	114	55,25
Others “”””””””	47	61	79	91	93	98	102	83,33	19,86
Fresh Legumes	0	4	10	17	22	28	33	16,33	11,50
Dried Legumes	0	0	3	13	15	28	39	17,75	14,47
Total Vegetables	164	164	174	207	231	282	328	218,08	60,74
Potatoes	0	0	0	10	20	43	66	17,67	25,62
Total Fruit	147	202	290	400	441	540	630	380,83	166,02
Fresh “”””””””	135	196	289	400	441	530	610	375,33	163,75
Dry “”””””””	0	0	0	0	0	0,5	1	0,17	0,408
Mealy “”””””””	0	0	0	0	0	0	0	0	0
Dry With Sugar	0	0	0	0	0	0	0	0	0
Preserved	0	0	0	0	9	16	20	5,33	8,64
Honey	0	0	0	0	7	15	20	5	8,37
Sweeteners	0	0	0	0	0	0	0	0	0
Sugar	0	0	0	0	0	1,5	3	0,5	1,22
Pizza/Sandwiches	20	20	26	43	43	43	43	35,33	11,88
Pizza	20	20	26	43	43	43	43	35,33	11,88
Sandwiches	0	0	0	0	0	0	0	0	0
Ready Meals	0	0	0	7	25	35	42	14,17	17,71
Dresserts	0	2	7	21	40	93	142	38,92	53,11
Alcoholic Drinks	63	66	81	137	209	243	261	149	81,64
Sugar Beverages	0	0	0	0	0	0	0	0	0
Juices	0	0	0	0	0	0	0	0	0
Sauces	8	12	17	23	37	41	43	25,67	13,84

Table 1: Mean standard deviation (SD) and daily food intake percentiles detected in the group of examined subjects at the beginning of the study.

The group of animal food (meat, fish and eggs) is consumed, from one half of the sample, on average, in excess of about 50% compared to the recommended amount by the former National Institute of Nutrition (INRAN); value increases if we include cheeses. By contrast, at least the 30% of the sample introduces cheese less than the recommended amount. In regard to milk and yogurt, we observed that, on average, these foods are consumed in amounts less than recommended by about the 75% of the sample, as evidenced from the distribution into percentiles.

As for cheese, their consumption, on average, it is appropriate to the recommended amount. The consumption of cereals is considerably less, on average, than the recommended amount and observing, then, the distribution in percentiles of consumption of this food group, it can be further noted that this nutritional inadequacy concerns almost all of the sample. Also relatively to vegetables, the consumption is lower than suggested. In regard to the consumption of fruit, instead, there is a much more favourable situation, given that the whole sample take it a suitable daily amount. As for the consumption of fats and oils, it is evident from the distribution into percentiles, that the 50% of the subjects brings an insufficient amount, while more than the 25% brings it in excess.

At the end of the group meetings we may notice that there have been changes (Table 2).

Food	Percentiles							Mean	SD
	0°	10°	25°	50°	75°	90°	100°		
Milk	0	0	25	105	178	257	314	120,75	121,10
Cheeses	25	25	25	28	41	53	62	35,67	14,94
Total Meat	42	60	83	98	111	145	175	101,08	43,98
Fresh ""	14	37	62	68	89	115	135	73,83	40,10
Offal ""	0	0	0	0	0	0	0	0,00	0,00
Preserved ""	18	18	20	26	33	37	40	27,25	8,90
Eggs	9	11	14	16	21	36	51	21,33	15,17
Total Fish	0	9	25	56	75	88	100	51,50	37,75
Fresh ""	0	9	25	56	75	81	86	49,17	34,44
Frozen ""	0	0	0	0	0	0	0	0,00	0,00
Preserved ""	0	0	0	0	0	7	14	2,33	5,72
Total Fats	30	30	34	45	49	52	55	42,50	10,37
E.V. Oil	30	30	34	45	49	52	55	42,50	10,37
Total Cereals	144	169	194	195	214	223	227	195,75	29,16
Bread	94	97	108	142	152	166	180	135,17	33,11
Others ""	41	44	48	54	67	83	96	60,58	20,12
Fresh Legumes	0	0	0	0	10	14	14	4,67	7,23
Dried Legumes	0	0	2	11	14	32	50	14,50	18,50
Total Vegetables	83	127	175	211	249	255	257	198,00	66,39
Potatoes	0	0	0	0	15	30	40	10,00	16,73
Total Fruit	201	203	240	346	425	562	675	370,83	176,64
Fresh ""	195	200	240	346	425	555	660	367,33	172,69
Dry ""	0	0	0	0	0	0	0	0,00	0,00
Mealy ""	0	0	0	0	0	0	0	0,00	0,00
Dry With Sugar	0	0	0	0	0	0	0	0,00	0,00
Preserved	0	0	0	0	4	10	15	3,50	6,12
Honey	0	0	0	0	0	12	25	4,17	10,21
Sweeteners	0	0	0	0	0	0	0	0,00	0,00
Sugar	0	0	0	0	0	3	7	1,17	2,86
Pizza/Sandwiches	22	22	22	23	38	43	43	29,33	10,61
Pizza	22	22	22	32	43	43	43	32,50	11,50
Sandwiches	0	0	0	0	0	0	0	0,00	0,00
Ready Meals	0	0	0	0	0	7	14	2,33	5,72
Dresserts	0	0	4	24	89	115	123	46,50	54,95
Alcoholic Drinks	26	60	103	198	437	576	660	278,33	249,92
Sugar Beverages	0	0	0	0	0	43	86	14,33	35,11
Juices	0	0	0	0	0	0	0	0,00	0,00
Sauces	32	32	32	35	41	43	44	36,83	5,38

Table 2: Mean standard deviation (SD) and daily food intake percentiles detected in the group of examined subjects at the end of the study.

In regard to the consumption of meat, fish and eggs, it's reduced even if remains above the recommended limits.

It is important to highlight how, in particular, the consumption of preserved meat, which represent one of the richest foods in cholesterol and saturated fats, is reduced.

Also regarding the consumption of cheeses, it is possible to note a significant reduction, even if at not adequate compared to the recommendation. Looking more closely it can be noted, in fact, as only the 10% of the sample continues to assume a suitable amount.

As for other food groups, we can see that there have been no important changes.

Table 3 shows data relating to daily energy, food ingredients and nutrients by the whole group of people examined at the beginning of the study.

Food	Percentiles							Mean	SD
	0°	10°	25°	50°	75°	90°	100°		
Proteins	70	70	71	97	122	134	146	100,67	33,33
Animal	39	41	42	62	84	92	989	65,00	26,61
Vegetable	20	21,	23	23	28	32	35	25,54	5,64
Mixed	4	5	7	9	15	17	18	10,54	5,68
Lipids	43	54	66	80	116	144	165	93,00	44,64
Saturated	10	15	21	24	40	46	47	28,35	14,68
Polyunsaturated	4	5	6	8	10	12	14	8,31	3,45
Monounsaturated	19	24	30	40	52	61	69	41,86	18,25
Carbohydrates	176	177	198	256	304	321	322	251,50	64,28
Starch	89	110	146	189	206	221	232	173,83	53,30
Soluble	36	43	54	65	75	94	110	67,67	25,26
ENERGY Kcal	1368	1493	1729	2404	2826	3138	3422	2345,00	792,36
KJ	5724	6245	7235	10058	11826	13130	14317	9810,90	3315,33
Fiber	20	20	20	26	30	31	32	25,60	5,95
Cholesterolo	189	203	218	265	350	386	408	284,69	89,68
Alcohol	4	6	11	22	29	35	40	21,00	13,56
Calcium	308	386	590	1070	1265	1323	1350	926,36	441,33
Iron	9	10	11	15	18	19	21	14,79	4,71
Copper	0,9	1	1,3	1,6	1,8	1,9	2	1,54	0,41
Sodium	1268	1611	1995	2420	2841	2891	2902	2307,21	647,12
Potassium	2003	2132	2333	2734	3432	3743	3881	2869,56	746,70
Phosphores	746	801	936	1345	1575	1678	1761	1274,73	415,25
Zinc	5,3	5,4	6,0	7,8	8,4	9,0	9,5	7,40	1,69
Thiamin	0,5	0,7	0,9	1,0	1,2	1,4	1,5	1,04	0,36
Riboflavin	0,6	0,9	1,2	1,5	1,9	2,1	2,1	1,48	0,55
Niac Equival	16	19	23	31	38	40	42	30,23	10,53
Niacin	6	8	11	14	20	21	22	14,61	6,07
RET. EQ	381	479	590	698	818	835	835	670,87	178,01
Retin.	41	46	59	104	169	262	341	137,48	112,40
Carotene	1831	1919	2057	2438	3367	3793	3987	2716,76	888,16
VIT C	33	66	109	148	169	194	213	135,90	62,92
VIT E	9	10	11	13	16	17	18	13,25	3,52
VIT B6	1,4	1,5	1,6	1,8	2,3	2,5	2,5	1,92	0,46
Folic Acid	206	263	321	327	364	411	447	333,77	78,87

Table 3: Mean standard deviation (SD) and distribution in percentiles daily intake of energy, food ingredients and nutrient at the beginning of the study.

Going to examine, first, the application of energy, it is observed an average value equal to 2345 kcal, but also how it is extremely differentiated and widely, varying from a minimum of 1368 to a maximum of 3422 kcal.

In order to estimate the average daily caloric requirement, we took into consideration that the subjects lead a rather sedentary life (1.35 PAL). This evaluation showed that most of the sample provides an amount of energy than necessary and a part a smaller amount (Table 4). This situation, in the long run, could result in modifications of anthropometric parameters, as overweight and obesity in the first case, and underweight in the second, with all the consequences that may arise.

Food	Percentiles							Medium	SD
	0°	10°	25°	50°	75°	90°	100°		
Proteins	46	60	74	78	93	97	97	78,3	18,9
Animal	17	30	43	46	53	57	60	44,4	15,0
Vegetable	18	19	20	22	25	28	30	23,1	4,2
Mixed	5	6	6	7	14	20	25	11,2	7,8
Lipids	57	58	64	86	105	119	131	88,2	29,0
Saturated	14	14	15	21	25	30	33	21,4	7,4
Polyunsaturated	6	6	7	8	9	11	12	8,5	2,1
Monounsaturated	2	16	30	36	49	55	58	35,6	19,9
Carbohydrates	198	201	209	232	257	266	271	233,3	30,1
Starch	131	136	140	149	171	177	179	154,0	19,9
Soluble	40	40	45	60	77	94	107	65,0	25,8
Energy Kcal	1479	1663	1920	2215	2414	2602	2750	2160,3	450,4
KJ	6191	6963	8038	9270	10102	10889	11505	9040,4	1883,1
Fiber	15	18	21	25	28	29	30	23,9	5,6
Cholesterolo	106	155	206	221	265	391	505	255,8	134,4
Alcohol	4	6	9	23	33	40	48	23,3	17,3
Calcium	346	408	537	766	984	1057	1066	743,7	294,1
Iron	9	9	10	13	16	17	17	13,1	3,4
Copper	1,3	1,3	1,3	1,5	1,9	2,5	2,9	1,8	0,6
Sodium	1914	2048	2262	2521	2929	3066	3074	2545,1	463,4
Potassium	1834	1933	2214	2849	3052	3111	3132	2631,0	559,9
Phosphores	747	890	1037	1097	1367	1473	1504	1153,3	281,5
Zinc	4,2	5,3	6,4	7,1	7,6	8,7	9,7	7,0	1,8
Thiamin	0,62	0,65	0,72	0,88	1,05	1,13	1,16	0,9	0,2
Riboflavin	0,92	0,96	1,05	1,35	1,53	1,59	1,62	1,3	0,3
Niac Equival	16	19	23	26	27	27	28	24,2	4,3
Niacin	10	11	13	13	14	17	19	13,8	2,8
RET. EQ	252	335	417	437	684	823	886	531,3	239,7
Retin.	25	45	67	75	115	225	322	115,0	106,7
Carotene	853	1025	1218	1715	2605	3127	3497	1955,5	1029,6
VIT C	37	41	47	52	59	120	181	71,4	54,1
VIT E	10	11	13	16	17	18	18	15,0	3,2
VIT B6	1,1	1,2	1,5	1,8	1,9	2,0	2,0	1,7	0,4
Folic acid	195	218	251	290	301	336	369	281,3	59,0

Table 4: Mean standard deviation (SD) and distribution in percentiles daily intake of energy, food ingredients and nutrient at the end of the study.

In regard to the protein intake, it is observed an average intake of about 100 g/day, corresponding to 1.2 g/kg body weight. This value may seem a bit high, but considering the diet “in toto” and the reduced digestive capacity and typical elder absorption, can be considered an adequate intake. The range of protein intake varies from 70 g/day to more than the double (146 g/day). From a qualitative point of view, the animal proteins are made in much higher quantities than those of vegetable origin.

In regard to the lipid intake, it is, on average, very high but also discordant, ranging from very low values (approximately 43 g/day) to other strongly elevated (about 165 g/day). Even from the point of view of the quality, irrationalities are observed: an adequate intake of monounsaturated fatty acids, in fact, is opposed by a high enough saturated and too low in polyunsaturated.

The carbohydrate intake is always too low and also highly unbalanced for the low starch content, on average, approximately to the 70% compared to the minimum recommended (90%).

The result that arises, therefore, is that of a highly imbalanced and irrational diet (Figure 1) for the high intake of lipids and partly of protein but, above all, for that too low in carbohydrates. The situation is further exacerbated by the poor quality of food.

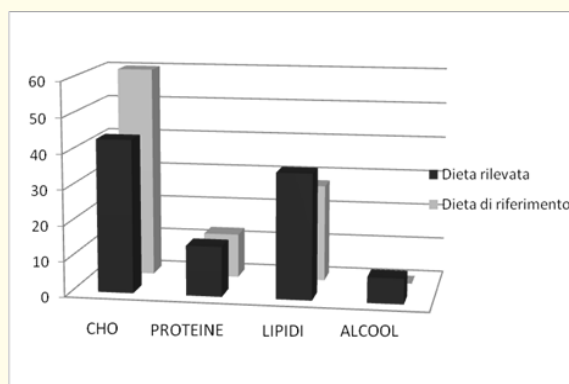


Figure 1: Percentage breakdown of dietary principles outlined at the beginning of the study.

In regard to the cholesterol, from the evaluation based on the energy introduced (100 mg/1000 kcal/day), it is clear that about the 70% of the sample brings it in an excessive amount (Figure 2).

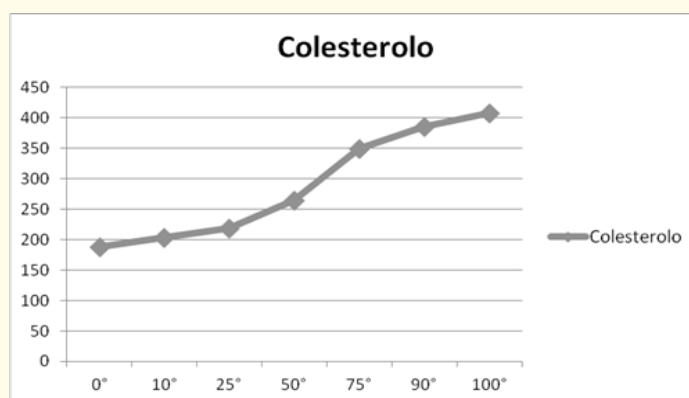


Figure 2: Distribution percentile intake of cholesterol, recorded at the beginning of the study.

Also relatively minerals irrationalities are observed. The iron intake is good, whereas we observe a too high sodium intake, especially in view of the fact that the detected quantity (2307 mg), refers only to that of the composition (that is naturally contained in food), regardless the one derived from salt added as a condiment; slightly lower is the potassium intake (2869 mg/day compared to 3100 mg/day is recommended), zinc (7 mg/day compared with 9 mg/day is recommended) and calcium intakes, for which, only the 50% of the sample provides it in an adequate amount.

Also in regard to the vitamin intake, there are some irrationalities: only thiamine and riboflavin are taken in adequate amounts. The larger inadequacy intake regards the folic acid, observed in about the 90% of the sample. As for fiber, it is taken in a significantly below amount (25.6 g/day, on average) that recommended (30 - 35 g/day) from the 75% of the sample (Figure 3).

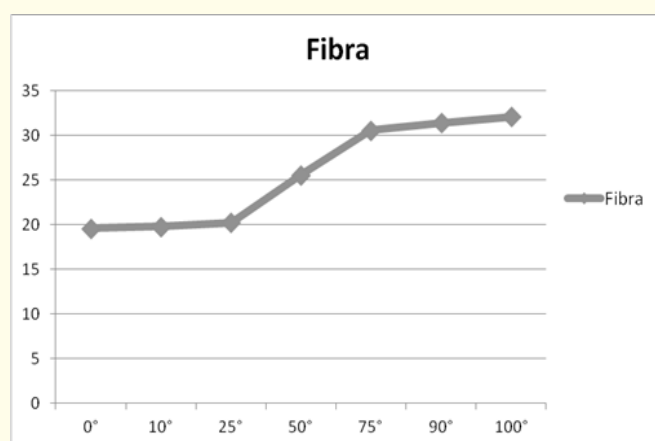


Figure 3: Distribution percentile intake of fiber, recorded at the beginning of the study.

The comparison made with data collected at the end of the study showed that in regard to the application of energy, although with a slight decline, continues to be, mostly, excessive compared to the needs (Table 4).

Food	Percentiles							Medium	SD
	0°	10°	25°	50°	75°	90°	100°		
Proteins	46	60	74	78	93	97	97	78,3	18,9
Animal	17	30	43	46	53	57	60	44,4	15,0
Vegetable	18	19	20	22	25	28	30	23,1	4,2
Mixed	5	6	6	7	14	20	25	11,2	7,8
Lipids	57	58	64	86	105	119	131	88,2	29,0
Saturated	14	14	15	21	25	30	33	21,4	7,4
Polyunsaturated	6	6	7	8	9	11	12	8,5	2,1
Monounsaturated	2	16	30	36	49	55	58	35,6	19,9
Carbohydrates	198	201	209	232	257	266	271	233,3	30,1
Starch	131	136	140	149	171	177	179	154,0	19,9
Soluble	40	40	45	60	77	94	107	65,0	25,8
Energy Kcal	1479	1663	1920	2215	2414	2602	2750	2160,3	450,4
KJ	6191	6963	8038	9270	10102	10889	11505	9040,4	1883,1
Fiber	15	18	21	25	28	29	30	23,9	5,6
Cholesterolo	106	155	206	221	265	391	505	255,8	134,4
Alcohol	4	6	9	23	33	40	48	23,3	17,3
Calcium	346	408	537	766	984	1057	1066	743,7	294,1
Iron	9	9	10	13	16	17	17	13,1	3,4
Copper	1,3	1,3	1,3	1,5	1,9	2,5	2,9	1,8	0,6
Sodium	1914	2048	2262	2521	2929	3066	3074	2545,1	463,4
Potassium	1834	1933	2214	2849	3052	3111	3132	2631,0	559,9
Phosphores	747	890	1037	1097	1367	1473	1504	1153,3	281,5
Zinc	4,2	5,3	6,4	7,1	7,6	8,7	9,7	7,0	1,8
Thiamin	0,62	0,65	0,72	0,88	1,05	1,13	1,16	0,9	0,2
Riboflavin	0,92	0,96	1,05	1,35	1,53	1,59	1,62	1,3	0,3
Niac Equival	16	19	23	26	27	27	28	24,2	4,3
Niacin	10	11	13	13	14	17	19	13,8	2,8
RET. EQ	252	335	417	437	684	823	886	531,3	239,7
Retin.	25	45	67	75	115	225	322	115,0	106,7
Carotene	853	1025	1218	1715	2605	3127	3497	1955,5	1029,6
VIT C	37	41	47	52	59	120	181	71,4	54,1
VIT E	10	11	13	16	17	18	18	15,0	3,2
VIT B6	1,1	1,2	1,5	1,8	1,9	2,0	2,0	1,7	0,4
Folic acid	195	218	251	290	301	336	369	281,3	59,0

Table 4: Mean standard deviation (SD) and distribution in percentiles daily intake of energy, food ingredients and nutrient at the end of the study.

From Table 5 it is possible to note, in regard to proteins, a sharp decrease, with an average daily intake of about 78 g (compared to the initial 100) and a range, always large but reduced, between 46 g/day to 97 g/day. Also the average contribution based on the weight fell from 1.2 to 1 g/kg body weight/day. From the qualitative point of view there are no changes.

COD.	Initial Values			Final Values		
	Requirements	Intake (Kcal)	Delta kcal (%)	Requirements	Intake (Kcal)	Delta kcal (%)
1	2280	2743	463(+20)	2223	2138	-85(-3)
2	2223	2854	631(+28)	2078	2750	672(+32)
3	1945	3422	1477(+75)	1868	2292	424(+22)
4	1558	1368	-190(-12)	1640	1848	208(+12)

Table 5: Initial and final values of requirements and kcal taken for each sample component. To the right, the Delta in absolute terms and as a percentage.

The diet of the examined subjects continues to be imbalanced and irrational (Figure 4) for the high intake of lipids and part of proteins and for too low in carbohydrates.

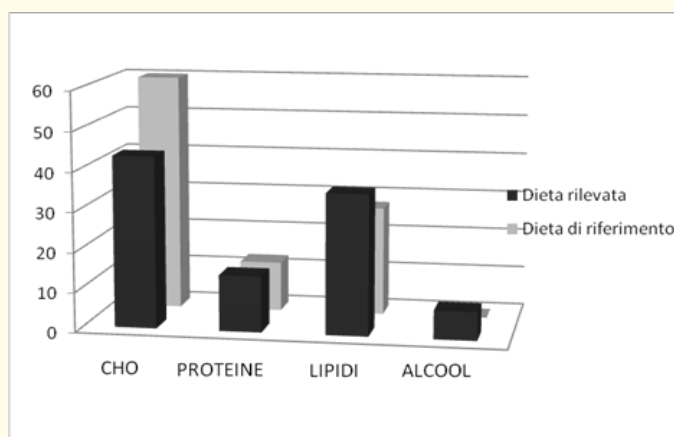


Figure 4: Percentage breakdown of dietary principles outlined at the end of the study.

In regard to cholesterol, it is possible to show an improvement: its average contribution is slightly reduced (from 284.7 mg/day to 255.8 mg/day) and only the 50% of the sample (compared to the initial 70%) exceeds the amount of 100 mg/1000 kcal/day (Figure 5).

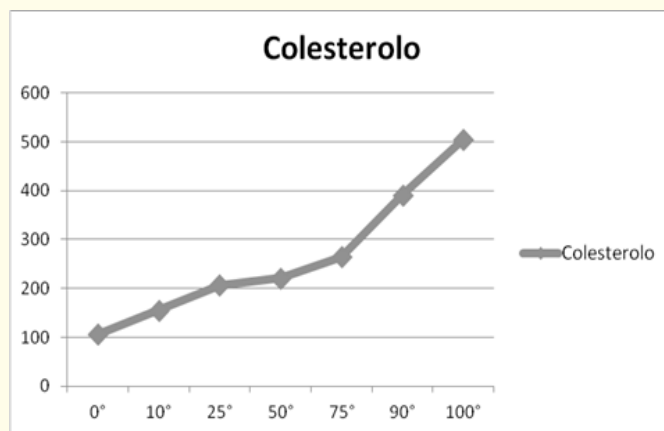


Figure 5: Distribution percentile intake of cholesterol, recorded at the end of the study.

In regard to minerals and vitamins, there are no particular changes, but a further reduction of the average calcium intake.

As for the dietary fiber, it continues to be assumed in a below quantity (23.89 g/day, on average) than the recommended (30 - 35 g/day) (Figure 6).

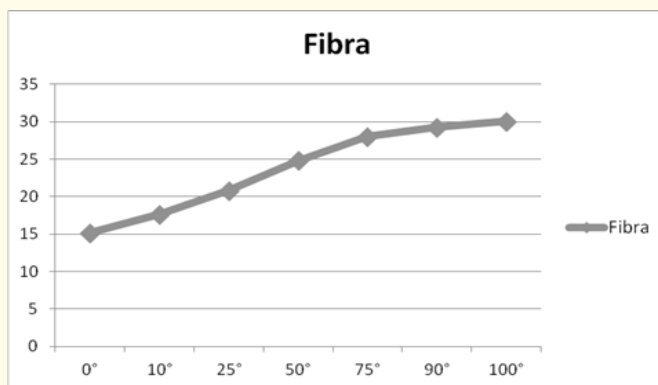


Figure 6: Distribution percentile intake of fiber, recorded at the end of the study.

Discussion

Data we obtained allow us to make a number of considerations regarding the detection of food consumption carried out; diets were, on average, all greatly imbalanced and irrational, because very low in carbohydrates and too high in protein, and especially in fats.

The low proportion of carbohydrates, in addition, is also highly imbalanced from the qualitative point of view, for the excessive intake of soluble sugars (simple) and animal proteins.

Also in regard to lipids, made in excessive amounts, we saw a further irrationality due to the quality of their composition, characterized by an excess of saturated fatty acids and an inadequate intake of polyunsaturated fats; however, the intake of monounsaturated fatty acids is acceptable.

The lipid profile is further worsened by the excessive dietary intake of cholesterol and the inadequate fiber intake.

The surveys conducted at the end of the group meetings revealed a slight reduction of proteins and lipids, and this shows how the subjects have tried to improve their diet as a result of the given suggestions.

Furthermore, it is important to highlight the reduction of conserved meat and cheese, which are the richest food in cholesterol and saturated fatty acids.

Among minerals, it is observed an insufficient intake of calcium, potassium and zinc, and excessive sodium, especially if we take into account that the amount exclusively refers to that of the composition, without taking into account the added salt in kitchen.

Even the vitamin intake is not always adequate, especially in relation to folic acid which is insufficient in about half of the examined individuals.

Furthermore, a good portion of our sample introduces an inadequate quantity of daily energy.

The rebalancing of food ration and the adoption of a rational diet, can only have a beneficial influence, especially when integrated with physical activity, on the improvement of mental and physical performance, for each individual of any age.

This study has established a preliminary study of education for the diabetic patient and it is useful in order to verify the importance of this type of intervention, aimed at improving the living conditions of patients suffering from this pathology. The results obtained, on balance positive, suggest that the arguments and methods of detection adopted can be applied successfully in future broader consistence projects.

Acknowledgements

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