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Low calorie diets in the prevention and treatment of human diseases

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ABSTRACT

Phytochemicals affect metabolic changes as well as organ changes. With their effects, they can prevent diseases or, in the case of established disease, affect speeding up conventional treatment. Low-calorie diets and other restrictive diets are challenging to follow for an extended period. As a result, they are less popular than non-restrictive programs that instead encourage good eating habits. In our experiment, we dealt with the health problems of 8 probands with the following health problems: high blood sugar level, overweight, high blood cholesterol level, high blood pressure. Before and after the end of the restrictive diet, we determined changes in the organism. Blood sugar levels, body weight, changes in blood pressure, subjective expression of pain, physiological values in the blood (cholesterol, hemoglobin, white blood cells, glucose, urea, cholesterol, thyroid function and hormones (T3 – triiodothyronine, T4 – thyroxine)) and urine (urine pH, urine proteins, glucose, ketones, urobilinogen, blood in urine and hemoglobin) were determined. As for blood biochemical parameters, positive changes were observed in almost all probands, except for the decreased creatinine level. After completing the restrictive diet, the participants' blood pressure moved towards normal values (120/80). In addition, the participants' body weight decreased by an average of 3-4.5 kg, which led to a change in their BMI (Body Mass Index). During the entire 7-day period of the diet, most of the participants initially reported negative subjective experiences, but at the end of the restrictive diet, they generally felt good.

Keywords: restrictive diet, health status, blood sugar level, physiological blood values, body weight

INTRODUCTION

Bioactive compounds have emerged as key food components related to healthy status and disease prevention. As population is getting older and less physically active, non-communicable diseases are increasing. In some cases, bioactive compounds are regarded as an interesting alternative for disease prevention and treatment. This is increasingly boosted by the increased need for natural products by the consumers, who require sustainable solutions for improving quality of life focused on personalized nutrition. The knowledge of the chemistry of natural products and their mechanistic approach are key elements for developing new solutions for this market. This chapter briefly addresses the importance of bioactive compounds and their role in non-communicable diseases **[1]**. There is no consensus in the literature to define the term “bioactive compound”. However, within the most widely accepted denominations, they are “compounds which have the capability and the ability to interact with one or more component(s) of living tissue by presenting a wide range of probable effects” **[2]**.

Unhealthy diets, malnutrition, and NCDs are closely linked. They are the logical consequences of, among other factors, today’s food systems, which have changed dramatically in the past 50 years. A focus on efficiency has seen an increase in the availability of inexpensive, high-calorie foods, often from staple cereal crops, reducing hunger for many. This has, however, often been at the expense of diversity and has displaced local, often healthier, diets. Access to diverse, micronutrient-rich foods – such as fresh fruits, vegetables, legumes, pulses, and nuts –

has not improved equally for everyone, and unhealthy foods with salt, sugars, saturated fats, and trans fats have become cheaper and more widely available.

Furthermore, global demand for and supply of meat, dairy products, sugar-sweetened drinks, and processed and ultra-processed foods has increased dramatically **[3]**. The increased consumption of sodium, used in food as a preservative and flavoring, contributes significantly to an unhealthy lifestyle. Table grapes belong to the most dietary balanced fruit **[4]**.

Under the term restrictive diet, we can imagine giving up certain eating habits. Such as fried steaks, mayonnaise salads, and alcoholic or non-alcoholic sugary drinks. We will include drinking vegetable and fruit juices, more fresh fruits and vegetables, various vegetable broths flavored with herbs and omit salting in the restrictive diet menu. Procyanidins are an important component of grapes and grape juices. These bioreducers have a broad-spectrum effect against cardiovascular diseases, inflammation, UV radiation, and trap free radicals. They are also a suitable nutritional supplement to the diet and can significantly ease the restrictions resulting from the diet **[5]**.

Most people think that if they should go on a diet, it will mean some suffering or restriction in their life. After going on a restrictive diet, they suddenly find that they are much better. They are more vital, full of energy, and have better blood count and systolic pressure. Several experimental studies that have been done on animals and humans have shown that diet is very important. It plays a huge role in the primary and secondary prevention of various diseases and is an important treatment element. In addition to eating, physical activity is also important, which reduces the risk of civilization diseases **[6]**.

Restrictive diets appear to improve eating behaviors, and the evidence reviewed argues against the notion that they may worsen the severity of binge eating. Moreover, they may lead to short-term changes in brain structure and improvements in cerebrovascular markers which, in turn, could impact eating behaviors. Non-restrictive interventions may have apositive effect on weight management and eating behaviors. However, evidence of their neural effects is scarce **[7]**. Obesity is a serious health problem that has spread worldwide and is thought to be a modifiable risk factor for several co-morbidities, including cancer, type 2 diabetes, hypertension, and sleep apnea **[8]**. There are many ways to manage and treat obesity, thus current tactics employed by healthcare experts shouldn't be viewed as a "one size fits all" strategy **[9]**, **[10]**, **[11]**. Current dietary intervention recommendations offer various methods to promote body weight loss and enhance other health aspects **[11]**.

Ailer et al. recommend the following energy intake for women and men of different ages (kJ/day) according to the physical load performed (Table 1) **[12]**.

Table 1 Energy intake for women and men of different ages (kJ/day).

	Woman		**Man**	
	Age			
Physical exercise	**19-30**	**31-50**	**19-30**	**31-50**
Low	8368	7531.2	10041.6	9204.8
Medium	9204.8	8368	10878.4	10460
High	10041.6	9204.8	12552	12133.6

Low-calorie diets and other restrictive approaches have historically been employed alone or in conjunction with behavioral and/or physical activity techniques to reduce body weight. However, these restrictive techniques have also been linked to many detrimental physiological or psychological outcomes, including weight regain over time, increased appetite, and more severe depressive symptoms **[13]**, **[14]**, **[15]**, **[16]**, **[17]**, **[18]**, **[19]**. These reactions to restrictive dietary practices may help to explain why it is difficult to maintain weight over the long term. However, current recommendations recommend interventions based on dietary patterns emphasising healthy eating (e.g., high consumption of fruits and vegetables, whole grains, nuts, low-fat dairy). Several non-restrictive strategies aim to improve body weight, appetite regulation, and other metabolic health markers. The management of eating disorders like binge eating disorder (BED) and disordered eating, such as emotional eating, restriction eating, or binge eating habits, may also be effectively accomplished using some of these non-restrictive measures **[20]**, **[21]**.

In the experiments, we investigated the effect of phytochemical, bioactive substances, contained in plant products consumed in food dishes as part of a modified diet on reducing the disease state of selected probands. We will evaluate the influence of the modified diet consumed based on the input values of the probands before completing the diet, which we compared with the output values (analysis of blood and urine), immediately after completing the modified diet.

Scientific Hypothesis

Bioactive plant metabolites have an impact on disease reduction and human treatment. Adjusting the diet is important for reducing the risk of diseases and speeding up the process of treating the disease.

MATERIAL AND METHODOLOGY

Samples

A total of eight probands were involved in the experiment (6 women and 2 men) at the age of 31 to 66 years.

Instruments

Glucometer BioLand G-423, BioLand Technology Ltd., China.
Arm Pressuremeter Beurer BM 65, Beurer GmbH, Germany.
Personal weight HBF-511B/T (Omron, Japan).

Laboratory Methods

Measurements were taken during the restrictive diet, 36 hours of food deprivation and immediately after the end of the experiment. G-423 glucometer was used to determine the change in blood sugar level. Blood pressure changes were determined with a Beurer BM 65 sphygmomanometer. Body weight changes were recorded by a personal digital scale (kg) and a height-length scale (cm). Changes in cholesterol levels were determined by a biochemical blood test in the laboratory. BMI (body mass index) was obtained by calculating – weight/height (in m^2). Changes in the subjective expression of pain were evaluated based on the probands' own feelings. Physiological values of blood (hemoglobin, white blood cells, glucose, urea, cholesterol, thyroid function, thyroid hormone (T3 – Triiodothyronine, T4 – Thyroxine)) and urine (urine pH, urine protein, glucose, ketones, urobilinogen, blood in urine and hemoglobin) were determined in certified medical laboratories.

Description of the Experiment

Sample preparation: For two days before arrival, the probands ate only light non-meat meals.

Design of the experiment: The experiment lasted 7 days. We were in constant contact with the probands, while we consulted with them about all the changes in the organism recorded during and after completing the 7-day adjusted diet. After the end of the experiment, there was subsequent longitudinal monitoring of their health status, especially those probands for whom the detoxification diet's duration was insufficient for a "complete" recovery, a return to optimal physiological values. The foods used and their preparation were:

- potatoes boiled in their skins, natural rice,
- vegetable juices: carrot (always about 2/3 of the juice volume), parsley, black radish, beetroot, cabbage, broccoli, celery, chicory (endive), herbal tincture (liquid extract from herbs),
- fruit juices from fruits: apples, pears, lemons, grapefruits,
- vegetable broth: a mixture of vegetables,
- herbs as ingredients: seasoning potatoes and rice with herbal spices – anise, true basil, kitchen garlic, garden marjoram, peppermint, nutmeg, oregano, rosemary, sage, saffron, thyme.

Regime actions during the 7-day restrictive diet are shown in Table 2-3.

Table 2 Guidelines for the 7-day restricted diet.

Day	Actions
1.-3.	reducing the energy intake of food in order to prepare the organism for not taking food
4.-5. until 12:30	without eating
5. from 12:30	increasing the energy intake of food in order to return to normal eating, such as on the 3rd day after lunch (vegetable salad)
6.	same as 2nd day (rice),
7. until 6:00 p.m.	same as 1st day (potatoes)

Table 3 Regime actions during the 7-day restrictive diet.

Time	Days			
	1.	**2.**	**3.**	
8:00	vegetable juice (2-3 dcl)	vegetable juice (2-3 dcl)	vegetable juice (2-3 dcl)	
8:30	1 ½ hour walk	1 ½ hour walk	1 ½ hour walk	
10:20	fruit juice (2 dcl)	fruit juice (2 dcl)	fruit juice (2 dcl)	
12:00	lunch (3 potatoes boiled in their skins individually flavoured with herbal spices, vegetable salad, vegetable broth)	lunch (rice individually seasoned with herbs, vegetable salad, vegetable broth)	lunch (vegetable salad individually seasoned with herbs, vegetable salad, vegetable broth)	
12:30	afternoon rest	afternoon rest	afternoon rest	
14:00	1 ½ hour walk	1 ½ hour walk	1 ½ hour walk	
15:45	vegetable juice (2 dcl)	vegetable juice (2 dcl)	vegetable juice (2 dcl)	
18:00	2 dcl of red wine	2 dcl of red wine	2 dcl of red wine	
21:00	bedtime, sleep	bedtime, sleep	bedtime, sleep	
	4.	**5.**	**6.**	**7.**
8:00	without eating (drinking water according to individual needs)	without eating (drinking water according to individual needs)	vegetable juice (2-3 dcl)	vegetable juice (2-3 dcl)
8:30	1 ½ hour walk	1 ½ hour walk	1 ½ hour walk	1 ½ hour walk
10:20	without eating (drinking water according to individual needs)	-	fruit juice (2 dcl)	fruit juice (2 dcl)
12:00		lunch (vegetable salad individually seasoned with herbs, vegetable salad, vegetable broth)	lunch (rice individually seasoned with herbs, vegetable salad, vegetable broth)	lunch (3 potatoes boiled in their skins individually flavoured with herbal spices, vegetable salad, vegetable broth)
12:30		-	afternoon rest	afternoon rest
14:00	1 ½ hour walk	1 ½ hour walk	1 ½ hour walk	1 ½ hour walk
15:45	without eating (drinking water according to individual needs)	vegetable juice (2 dcl)	vegetable juice (2 dcl)	vegetable juice (2 dcl)
18:00		2 dcl of red wine	2 dcl of red wine	-
21:00	bedtime, sleep	bedtime, sleep	bedtime, sleep	-

The mentioned fruits and vegetables were provided uniformly from the family-growing farm. The drinking regimen was applied individually by the probands as needed, drinking only fresh water or unsweetened green tea (except during the period of not taking food, when they only drank freshwater). During the entire experiment, we were in contact with the doctors to intervene in case of deterioration of the probands' health condition. Probands performed random physical exercises every day (1½ hours) even when not taking food and drank only pure water (36 hours in the middle of the diet). Table 4 shows basic information about the probands before the restrictive diet.

Probands recorded daily in writing all ongoing cognitive and somatic changes in their organism, which we subsequently evaluated and were part of the overall evaluation. After taking blood, urine, and stool (after completing a modified diet), we evaluated the changes in the given indicators. After the end of the experiment, we had constant contact with the probands and then longitudinally monitored their health status, especially those probands for whom the detoxification diet's duration was insufficient for a "complete" recovery, a return to optimal physiological values.

Table 4 Basic information about the probands before the restrictive diet.

Probands	Sex	Age	Body weight	High	Profession, activity	Health problems
1	W	43	69.5	172	teacher, trainer, regularly plays sports (running, weight training)	high cholesterol, problems with hydration
2	M	66	108	180	teacher, veterinarian, she played sports in her youth, now she bikes and hikes	swelling of the lower limbs (especially in the evening), migraine, type 2 diabetes mellitus
3	W	31	55	165	housewife swims regularly	low pressure, dizziness, digestive problems (bloating), zhaemorrhoids
4	W	52	65	169	saleswoman, exercises at home, goes to the gym, goes for long walks	lupus, joint pain
5	M	35	80.6	178	computer scientist played football, now works out, cycles and skis	tense body, trouble falling asleep, swollen abdomen in the stomach area
6	W	29	48	156	kindergarten teacher, seasonal sports	scattered hormones, problems with menstruation, acne on the back and face
7	M	42	98	180	fitness trainer, strengthens	joint and knee pain
8	W	56	76	168	teacher, veterinarian, hiking, cycling and seasonal sports	migraine, knee pain, high cholesterol

Statistical Analysis

The results were processed using Microsoft Excel software (Microsoft, USA).

RESULTS AND DISCUSSION

Table 5 shows the reference values of blood biochemical parameters and Table 6 shows the values of these parameters determined before and after the restrictive diet. In proband 1 there was a decrease in glucose, cholesterol (LDL and HDL cholesterol) and urea. On the contrary, there was a slight increase in triglycerides and creatinine. In proband 2 there was a decrease in glucose, cholesterol (LDL and HDL cholesterol) and urea. After the post-restrictive diet, creatine also decreased, but triglycerides increased (with which the subject has a long-term problem). In proband 3, there was a decrease in glucose, cholesterol (LDL and HDL cholesterol), triglycerides and urea, the value of creatinine did not change. The same trend was observed in proband 4, but the value for creatinine was slightly higher. In probands 5-8 there was a decrease in glucose, cholesterol (LDL and HDL cholesterol), triglycerides, urea and creatinine

Table 5 Selected reference values of blood biochemistry before starting the diet (mmol/l).

Parameter	Reference values
Glucose	4.10-5.80 mmol/l
Cholesterol	2.90-5.20 mmol/l
LDL cholesterol	1.00-3.10 mmol/l
HDL cholesterol	1.00-2.13 mmol/l
Triglycerides	0.45-1.70 mmol/l

Table 6 Biochemical parameters of blood of the probands.

Parameter	Blood analysis values of the probands before and after the diet (mmol/l)							
	1		2		3		4	
	before	after	before	after	before	after	before	after
Glucose	4.12	4.05	14.63	6.02	3.76	3.11	4.99	3.56
Cholesterol	7.95	6.56	5.33	5.10	5.65	5.32	6.87	6.20
LDL cholesterol	4.55	4.22	2.74	3.05	2.55	2.30	5.16	5.08
HDL cholesterol	2.19	1.78	1.52	1.20	2.19	2.05	1.67	1.52
Triglycerides	0.60	1.07	2.52	2.88	1.45	1.43	1.20	1.00
Urea	6.00	3.86	8.16	9.670	4.30	3.86	5.00	3.86
Creatinine	91.01	101.1	97.84	119.60	79.0	79.0	98	95
Leukocytes	3.81	4.20	8.34	9.02	5.97	6.11	7.13	7.82
Erytrocytes	4.91	5.03	5.03	5.03	4.72	4.75	4.09	5.13
Hemoglobín	151.00	152.00	128.00	130.00	144	144	128	132.00
Trombocytes	181.0	181.0	317.00	317.00	268	210	318	340
	5		**6**		**7**		**8**	
	before	**after**	**before**	**after**	**before**	**after**	**before**	**after**
Glucose	4.50	3.25	5.10	4.04	5.4	4.18	5.20	4.16
Cholesterol	6.02	4.64	4.68	4.03	8.7	6.5	6.45	4.80
LDL cholesterol	4.22	3.66	3.20	3.00	4.90	6.22	3.15	3.03
HDL cholesterol	1.68	1.47	1.52	1.12	2.50	2.01	1.92	1.28
Triglycerides	1.09	1.04	0.67	0.52	1.45	1.22	1.00	0.90
Urea	7.00	4.18	5.20	3.86	6.8	4.18	4.30	3.00
Creatinine	90.00	85	72	64.5	98	102	75	71
Leukocytes	4.67	5.13	3.81	5.30	4.20	5.13	5.20	6.80
Erytrocytes	4.56	5.03	4.91	5.03	4.93	5.00	4.50	5.70
Hemoglobín	153.00	153.00	124	126	155	157	123	125
Trombocytes	178	179	160	163	200	200	160	160

Table 7 lists the reference blood pressure values by categories. Table 8 shows the blood pressure values measured in the probands. A trend was noted for all probands when blood pressure was positively adjusted.

Table 7 Reference blood pressure values.

Extremely low pressure	<49	<34
Very low pressure	50-69	35-39
Low pressure	70-89	40-59
Lower normal	90-110	60-75
Normal	120	80
Prehypertension	120-139	80-89
High pressure - grade 1.	140-159	90-99
High pressure - grade 2.	160-179	100-109
High pressure - grade 3.	180-209	110-119
High pressure - grade 4.	>210	>120

Table 8 Blood pressure values of the probands.

Proband	Blood pressure before starting the diet (mm Hg)	Blood pressure after the diet (mm Hg)
1	135/91	130/86
2	110/70	117/80
3	77/58	100/60
4	122/84	120/80
5	121/80	117/80
6	90/70	100/75
7	125/90	120/80
8	80/120	80/100

Tables 9 and 10 show the reference values for BMI and the values that were measured in the probands before and after the restrictive diet. All probands experienced body weight loss in the range of 3-4.5 kg.

Table 9 BMI (body mass index).

Underweight	<18.5
Normal weight	18.5-24.9
Excess weight	25-29.9
First obesity zone – Moderate obesity	30-34.9
Second obesity zone	35.39.9
Morbid obesity	>40

Table 10 Body weight and BMI of probands.

Proband	Body weight before/after the diet (kg)	BMI before / after the diet
1	69.5/65	23.3/22.61. i.e. normal body weight
2	108/104	33.3 1st degree obesity/32.1 1st degree obesity
3	55/52	20.2 ideal weight/19.1 underweight
4	65/62.2	22.76 normal weight/21.78 normal body weight
5	80.6/76.5	25.44 overweight/24.14 normal body weight
6	48/45.5	19.72 underweight/18.7 underweight
7	98/93.5	30.25 1st degree obesity 1. (due to strengthening and the total % of muscle mass, data on the BMI result are distorted in this proband)/29.01 overweight
8	76/73	26.96 overweight and after restrictive diet 25.86 i.e. overweight.

Table 11 shows the recorded subjective feelings of all 8 probands that they reported during the 7-day restrictive diet.

Table 11 Recorded subjective feelings during a seven-day restrictive diet.

Probands	Subjective feelings during a restrictive diet						
	1	**2**	**3**	**4**	**5**	**6**	**7**
1	15.00 - headache and a cold, 22.30 – shivering, heat, cold, conditions for vomiting, sweating (headache pills)	limb stiffness during exercise, cold, difficult speech, mild headache, an increase in energy in the afternoon, good sleep with dreaming	heavy legs in the morning after waking up, inability to exercise (only walking), mild headache, sleepy, low energy, afternoon nap 20 min.	tired, nervous, sleepy, morning nap 30 min. with dreams, heavy legs, malaise	afternoon nap 1 h 20 min, malaise, heavy legs, dark urine at night, constatnt dreams at night	great sleep, doesn´t feel hungry, feels good, heavy legs, a burst of energy, dreams at night constantly	heavy legs in the morning, cold, rush of energy and a good feeling
2	feels good	hungry, mild headache	rush of energy, doesn´t feel hungry	rush of energy, doesn´t feel hungry	weakness, fatigue	malaise	fatigue

Table 11 Cont.

Probands	Subjective feelings during a restrictive diet						
	1	2	3	4	5	6	7
3	hunger, dizziness, fatigue	hunger, mild headache, restlessness	nervousness, sleepy, cold, low energy	tired, nervous, malaise	dizziness	energy boost, great sleep, doesn´t feel hungry	cold, rush of energy, good feeling
4	conditions for vomiting, hunger	mild headache, good sleep	sleepy, low energy, nerveless	energy boost, good feeling, doesn´t feel hungry	rush of energy, good feeling	great sleep, doesn´t feel hungry, good feeling	heavy legs in the morning, cold
5	bad sleep at night, headache until 11:00, sluggish, weak, after 11:00 euphoria, good mood, a rush of energy, evening depression feeling like before an illness, headache, watery diarrhea strange taste in the mouth and plaque on the teeth, blurred image of headache, hunger and trembling hands, tensed body, problem with falling asleep, bloated abdomen in the stomach area	a surprising day of the opposite nature, a good feeling calm, slightly tired, he managed the whole training well, good at work, headaches are not the only gentle pressure in the forehead area	tired	tired, heavy legs, malaise	malaise	tired, tired muscles, hard to walk, great sleep, doesn´t feel hungry, feeling good	heavy legs in the morning. cold, energy boost and godd feeling

Table 11 Cont.

Probands	Subjective feelings during a restrictive diet						
	1	2	3	4	5	6	7
6	headache, tingling and trembling of the limbs, urge to vomit after eating potatoes 2 hours apart, cold, conditions for vomiting, sweating	malaise, small headache, energy boost after lunch, good sleep	heavy legs in the morning, inability to exercise (only walking), in the evening depression, skin manifestation on the face and back in the form of red rashes, headache, sleepy, low energy	tired, at lunch, the crisis began, shaking of the hands, trembling of the whole body, malaise	malaise, tired	great sleep, doesn´t feel hungry, feels good, heavy legs, rush of energy	cold, rush of energy
7	sleeps after training, unfocused, headache, sweating (medication used)	Headache, sweating, limb stiffness during exercise, cold, difficult speech, good sleep	heavy legs in the morning, inability to exercise (only walking), mild headache, fatigue, low energy	weak, nervous, sleepy, heavy legs, malaise	heavy legs, malaise	dreams at night constantly, great sleep, doesn´t feel hungry	heavy legs in the morning, cold
8	feels good, hunger	feels good, hunger, mild headache	feels good, hunger	hunger, nervosity	cold, hunger, nervosity	nervosity	dizziness**,** weak, without energy

Proband 1 reported feeling good about managing the restrictive diet. After the restrictive diet, cramps, tremors and excessive stool appeared the next day. Proband 2's creatine decreased, but cholesterol triglyceride increased (proband has a long-term problem with this). After completing the restrictive diet, they discovered cramps, tremors and excessive stool the next day. After the restrictive diet, he feels great. After completing the restrictive diet, Proband 3 felt well. Digestive problems improved. Proband 4 reported that he felt great after the restrictive diet. Proband 5 feels hungry and in a good mood. After completing the restrictive diet, he feels great and is determined to repeat it. After the restrictive diet, proband number 6's acne improved, and she felt relieved and great. Proband 7 developed convulsions, tremors, and excessive stools the next day after completing the restrictive diet. He was already looking forward to finishing the diet, it was suffering for the proband. Because he does weight training, his glycogen was quickly depleted, and he had the above conditions (Table 10). Proband 8 developed convulsions, tremors and had excessive stools on the second day after completing the restrictive diet. After the restrictive diet, he feels great.

Several studies have evaluated the signifcance of the glycemic index of various foods and glycemic load in patients with acne, demonstrating individuals with acne who consume diets with a low glycemic load have reduced acne lesions compared with individuals on high glycemic load diets. Dairy has also been a focus of study regarding dietary infuences on acne; whey proteins responsible for the insulinotropic efects of milk may contribute more to acne development than the actual fat or dairy content. Other studies have examined the effects of omega-3 fatty acid and γ-linoleic acid consumption in individuals with acne, showing individuals with acne beneft from diets consisting of fsh and healthy oils, thereby increasing omega-3 and omega-6 fatty acid intake **[22]**.

Millions of people suffer from painful and swollen joints associated with arthritis. In thepast, many doctors told arthritis patients that dietary changes would not help them. However, this conclusion was based on older research with diets that included dairy products, oil, poultry, or meat **[23]**, **[24]**. New research shows that foods

may be a more frequent con-tributor to arthritis than is commonly recognized. Patient interest in the effect of diet on RA has been noted for decades. Among a number of small clinical trials of dietary manipulation in RA (Rheumatoid arthritis), modest benefit has been noted for high-dose omega-3 fatty acids, fasting, vegetarian diet, and Mediterranean-type diet **[23]**, **[25]**, **[26]**. Safiri et al. **[27]** examined the effects of dietary modification on arthritis pain and disease severity in 44 adults previously diagnosed with rheumatoid arthritis randomized to a diet (vegan diet for 4 weeks, elimination of other foods for 3 weeks, and then reintroduction of eliminated foods individually for 9 weeks) or an additional (placebo) phase for 16 weeks. As a result, the disease activity score decreased. The mean number of swollen joints decreased from 7.0 to 3.3 in the diet phase ($p = 0.03$) and increased from 4.7 to 5 in the classic diet phase.

Kjeldsen et al. **[28]** in a controlled, single-blind trial tested the effect of fasting for 7-10 d, then consuming an individually adjusted, gluten-free, vegan diet for 3.5 mo, and then consuming an individually adjusted lactovegetarian diet for 9 mo on patients with RA. For all clinical variables and most laboratory variables measured, the 27 patients in the fasting and vegetarian diet groups improved significantly compared with the 26 patients in the control group who followed their usual omnivorous diet throughout the study period. One year after the patients completed the trial, they were reexamined. Compared with baseline, the improvements measured were significantly greater in the vegetarians who previously benefited from the diet (diet responders) than in diet nonresponders and omnivores. The insufficient intake of fruit regularly 5 times a day has been evaluated in research work of Juríková et al. **[29]**.

In the study by Markovič et al. **[30]** energy restriction (d4) reduced fasting plasma glucose, independently associated with reduced carbohydrate intake. Both energy restriction and body weight loss have beneficial effects on insulin action and glycemic control in obesity. The effect of energy restriction is related to changes in individual macronutrients, while the effects of weight loss are related to changes in abdominal fat.

It is well-recognized that standard caloric restrictions (1500 kcal/day) are usually poorly effective in achieving body weight losses in overweight type 2 diabetic patients. For that reason very low-calorie diets (VLCDs) were developed as a mean for initiating or accelerating body weight reduction. Short-term studies indicate that VLCDs generally result in body weight losses that are three times greater than those obtained with standard low-calorie diets. Fasting blood glucose values are improving in parallel to body weight losses and in many patients the improvement in glycemic control is better than that expected from the magnitude of body weight losses **[31]**.

Vegetarian diet consumption associated with lower concentrations of TC, LDL-C and HDL-C. High-density lipoprotein cholesterol was also lower in the vegetarian groups than in the Western diet groups. Clinical studies also reflect the long-term effects of a vegetarian diet on plasma lipids. Those who follow a vegetarian diet for longer may have a healthier body composition, which may affect blood lipids. The effects of a plant-based diet on plasma lipids are likely to be largely the result of differences in saturated fatty acid intake and, to a lesser extent, cholesterol intake **[32]**. In the set of assayed in research Fatrncová-Šramková et al. **[33]** female was noticed overlapped intake of cholesterol (450 mg and more) among 60% offemale with negative impact on incidence of cardiovascular diseases. The better results in cholesterolintake achieved Ervin **[34]**, 72% of older adults met the guidelines for cholesterol.

A significant difference in a study **[35]** was reported for TC, LDL and TG levels between samples. Higher levels were reported by consumers of a Western diet versus reduced levels in vegetarians, with the lowest levels reported by vegans.

According to Bunner et al. **[36]** dietary interventions may offer a promising approach to migraine. A low-fat, plant-based diet reduces headaches' frequency, intensity, and duration while reducing medication use. The most commonly reported triggers in these and other analyzes include: chocolate, cheese, citrus, alcohol, and coffee. In this study, patients reported triggers retrospectively, but other studies have identified triggers through elimination diets.

Although many acute and preventive medications are now available to treat migraine headaches, many patients will not experience significant improvement in headache frequency and severity unless lifestyle modifications are made. Due to the myriad side effects of traditional prescription drugs, the demand for "natural" treatments such as vitamins and supplements for common ailments such as headaches is also increasing. Studies examine the evidence for supplements in the treatment of migraine **[37]**.

The beneficial effects of a vegetarian diet on blood pressure control have been confirmed in many studies. A vegetarian diet is associated with a significant reduction in blood pressure compared to a Western diet, suggesting that it may play a key role in the primary prevention and overall management of hypertension **[38]**.

In our study, we used a diet that we chose, and it was consistent with other studies. Bernard study examined a vegan diet that incorporated vegetables, fruits, grains, and legumes, including vitamin B12 supplementation. This diet was characterized by its high fiber content and low-fat content, and there were no limitations on the amount, energy, or carbohydrate intake **[39]**. The 2017 study by the same author also implemented a diet with the same

composition **[40]**. In a study conducted by Bloomer et al. in 2015, they utilized a vegan-based Daniel fast diet that eliminated processed foods and animal products, without limiting food portion sizes **[41]**. The GEICO studies conducted in South Korea by Ferdowsian et al. and Mishra et al. **[42]**, **[43]**, as well as the studies by Macknin et al. **[44]** and Nicholson et al. **[45]**, all adopted a similar low-fat vegan diet similar to the one practiced in Bernard's study. Hunt et al.'s study, on the other hand, employed a lacto-ovo-vegetarian diet that included legumes, whole-grain bread and cereal products, and higher quantities of fruits and vegetables. This diet had 25% less protein, 12% less fat, 16% more carbohydrates, 21% more ascorbic acid, slightly lower saturated fat, and less than 100 mg/d less cholesterol than the nonvegetarian diet **[46]**. Prescott et al.'s interventional diet was based on the dietary practices of Seventh Day Adventist vegetarians as studied in Rouse et al. **[47]**. Ramal et al.'s study **[48]** utilized a plant-based diet adapted from the 30-Day Diabetes Miracle Cookbook **[49]** to accommodate the ethnic groups involved.

CONCLUSION

Eight probands participated in the seven-day restrictive diet. During this diet, the probands could consume a specifically vegetarian diet. In the case of blood biochemical parameters, there were positive changes in all probands, except for two probands, in which there was a significant decrease in creatinine. The probands' blood pressure after the restrictive diet's end shifted towards the values for normal pressure of 120/80. The body weight of the probands after the end of the diet decreased in the range of 3-4.5 kg, and thus there was also a change in their BMI. The subjective feelings of most of the probands recorded during all 7 days of the diet were negative on the first days (they felt tired, hungry, had headache, the feeling of heavy legs), but on the seventh day they felt surges of energy, had good sleep, and felt better. Dietary changes are crucial for lowering illness risk and hastening the course of treatment after a disease has been identified. Therefore, we recommend increasing the consumption of fruits and vegetables – fresh vegetables are the most suitable, salt and season food only moderately, limit fatty foods, eat regularly 5-6 times a day and in smaller portions, ensure enough movement.

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