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The changes in blood lipid levels and body weight following the supplementation with glucomannan and red yeast rice extract in a small intervention study

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Abstract

Glucomannan and red rice extract combined in a dietary supplement could exhibit a synergistic effect in lowering blood lipid levels. We aim to explore the changes in blood lipid levels, and body composition in healthy middle-aged overweight people with mild hypercholesterolemia following the 45-day intake of a dietary supplement containing glucomannan and red rice extract. We present a single-arm non-randomized, non-blind intervention study. In total, 31 participants consumed a dietary supplement containing glucomannan dietary fibers (Konjak glucomannan, E425ii, 4 grams) and red rice extract (Monascus purpureus, 1 gram) for 45 days, without changes in their current diet. Body weight and composition were measured every two weeks. Blood lipids were tested at the beginning and the end of the intervention. After 45 days, there was a significant decrease in total cholesterol (by 16-18%), LDL cholesterol (by 20-24%), and triglyceride levels (by 11-23%) in both genders. In addition, women lost on average about 1 kilogram of body weight, 1.5 kilograms in body fat, and decreased their body mass index by 0.5 kg/m^2. In men, body composition did not change. Concurrent use of glucomannan and red yeast rice extract resulted in a significant reduction in blood lipid levels in both genders. It could be a safe and effective treatment option for the population of healthy middle-aged overweight people with mild hypercholesterolemia.
Trial registry information. Study protocol was registered under ChiCTR1800016300.

Key words: *dietary supplement; glucomannan; red rice extract; body weight; blood lipids.*

INTRODUCTION

Red yeast rice is a dietary supplement traditionally produced in China by fermenting rice (*Oryza sativa*) using the yeast *Monascus sp*. The process leads to the typical reddish coloration of the rice and induces the production of monacolin K, some unsaturated fatty acids, and phytosterols, which are capable of lowering blood cholesterol levels [1]. Red yeast rice supplements are widely commercially available and usually recommended for cholesterol lowering in people who refuse or cannot tolerate statins [2]. Recent studies concentrate on its effects on diabetes, obesity, hypertension, osteoporosis [1], and possible neuroprotective, anti-inflammatory, antibacterial, and anti-carcinogenic properties [3]. It is considered as safe as the other statins [2,3]. Patients are advised to learn about the expected health benefits and the potential risks of red yeast rice supplements before use [4].

Glucomannan is a water-soluble, fermentable dietary fiber extracted from the tuber or root of the elephant yam, also known as konjac *(Amorphophallus konjac)* [5]. The konjac tuber is traditionally used in Asia as an herbal remedy, flour, food stabilizer, and gelling agent [5]. All water-soluble fibers bind water and make bulk in the gastrointestinal tract, which increases the transit time of food, prolongs gastric emptying time, suppresses hepatic cholesterol synthesis, and increases cholesterol elimination. These processes, in turn, im-

prove satiety, decrease postprandial glucose uptake, and decrease the ingestion of foods that elevate cholesterol. That is why glucomannan supplements may treat constipation, reduce body weight, and decrease cholesterol and blood glucose [5]. Novel studies focus on its prebiotic, immunomodulatory, and anti-inflammatory properties [6].

The European Food Safety Authority (EFSA) has approved specific health claims for both glucomannan and red yeast rice supplements. EFSA approves of the health claims stating that the consumption of glucomannan leads to body weight loss in the context of an energy-restricted diet, but only if consumed in the dose of at least 3 grams daily divided into three doses, together with 1-2 glasses of water before meals [7,8]. On the other hand, EFSA released a claim that monacolin K from red rice taken in a dose of at least 10 mg daily is associated with the maintenance of normal blood LDL cholesterol levels [9].

To the authors' knowledge, clinical interventions on concurrent use of glucomannan and red rice extract are missing. We hypothesized that the two constituents combined in a single dietary supplement would synergistically lower blood lipid levels and decrease body weight in adults with mild hypercholesterolemia. The goal of the present study was to explore the changes in blood cholesterol and triglyceride levels, biochemical parameters, body weight, and body composition in healthy middle-aged overweight people with mild hypercholesterolemia following the 45-day intake of a dietary supplement containing both glucomannan and red rice extract.

METHODS

The study took place in the Nutrition Counseling Unit of the Institute of Hygiene and Medical Ecology, from June 1st to September 30th 2018. The survey was designed as single-arm non-randomized, non-blind intervention study. All persons who came for dietary counseling were eligible to participate in the study, given that they met the inclusion criteria and signed the informed consent form. The inclusion criteria were: age between 18 and 70 years, body mass index above 25 kg/m^2, cholesterol level above six mmol/l, and not using any cholesterol-lowering medicines for at least a month prior to the enrollment in the study. The exclusion criteria were malignant diseases, chronic kidney or liver diseases, chronic bowel diseases, and pregnancy.

In the beginning, 38 participants of both genders were eligible for the study. Seven participants did not follow the protocol of the study (three persons did not take the supplement as instructed, and four persons failed to return for regular check-ups); they were, therefore, excluded from the further statistical analysis. Minimum sample size of 31 patients was calculated based on previously reported significant reduction in mean values of blood cholesterol levels of 1 mmol/l and the effect size of 0.5. The calculation was performed online using a power of 80% and a two-sided level of significance of 5%.

The study was approved by the Ethics Commission of the Faculty of Medicine, University of Belgrade in April 2018 (Number 2650/IV-14), and was registered by the Chinese Clinical Trials Registry in May 2018 (Registration number ChiCTR1800016300).

Participants were asked to consume a supplement containing dietary fibers (*Konjak glucomannan*, E425ii, 4 grams) and red rice extract (*Monascus purpureus*, 1 gram), approved by the Ministry of Health of the Republic of Serbia (Number 9142/2016). They were instructed to consume the supplement for 45 days two times per day. With this recommendation, the total daily intake of glucomannan was estimated at 4 grams, and monacolin K at 10 milligrams. The supplement was provided in white, unmarked sachets; one sachet was to be consumed 15 to 20 minutes before lunch with two glasses of water, and the second sachet before dinner in the same way. Participants were advised not to change their regular eating habits and not to engage in rigorous physical activity during the study. We warned them about the possible adverse effects of the supplement and instructed them to reduce the dose if the unpleasant symptoms persisted.

The study protocol consisted of four visits, each scheduled every 15 days. At baseline, patients' body weights and compositions were measured, and blood samples were taken for the initial laboratory analysis. Participants received 30 sachets of the supplement for the next weeks. On the following two visits, i.e. on the 15th and 30th day of the study, body weight and composition measurements were repeated; again, the supplement was provided for the following period. Finally, at the end of the study (the 45th day), body weight and composition were measured, and blood samples were taken for the final laboratory analysis.

All parameters were measured by a trained nurse. Body height was measured on the anthropometer scale to the nearest 0.5 cm. Body weight was measured on a digital scale (InBody 720 Body Composition Analyzer) to the nearest 0.1 kg. Participants were barefoot and in light clothes. Body mass index (BMI) was calculated as body weight (kilograms) divided by squared body height (meters). Body composition was assessed using an impedance device (InBody 720 Body Composition Analyzer): total body water (liters), fat-free mass (kilograms), skeletal muscle mass (kilograms), body fat mass (kilograms), percent of body fat, and visceral fat area (centimeters squared). Waist and arm circumferences were measured in centimeters using an elastic tape.

Participants had their blood samples taken by a trained nurse in the morning, before meal. The fol-

lowing biochemical parameters were analyzed with standard procedures: glucose, total cholesterol, HDL (high-density lipoprotein) cholesterol, LDL (low-density lipoprotein) cholesterol, triglycerides (all in mmol/liter), urea (mmol/liter), creatinine (μmol/liter), uric acid (μmol/liter), bilirubin (μmol/liter), alanine aminotransaminase (ALT) (U/L), aspartate aminotransferase (AST) (U/L), gamma-glutamyl transpeptidase (gamma GT) (U/L) and creatine phosphokinase (CPK) (U/L).

At baseline, participants fulfilled a questionnaire with socio-demographic data: age, gender, and education level (secondary school, high school, university). Smoking habits were defined as being a non-smoker, ex-smoker, or an active smoker. Alcohol consumption was self-reported as drinking "3-5 glasses per day", "1-2 glasses per day", "rarely" or "never". Daily physical activity level was also self-estimated on a scale ranging from 1 – "not at all physically active" to 10 – "extremely physically active". As for eating habits, participants reported the number of meals taken on a typical day.

Descriptive statistic is presented as mean values and standard deviation for numeric variables or as percentages (relative numbers) for categorical variables. The differences between genders were tested with Student's t-test for parametric data, and with Mann-Whitney U test or Pearson's chi-square test for nonparametric data. The differences in anthropometric and biochemical parameters between the visits were tested with Student's paired-samples test for parametric data, or with Wilcoxon signed ranks test for nonparametric data. Statistical analyses were performed using SPSS software v25.0 for Windows (SPSS Inc. 1989-2017).

RESULTS

Men and women shared similar ages, physical activity levels, education, and smoking habits; they also consumed alcohol in the similar pattern and had similar number of meals per day (**Table 1**).

During the intervention period of 45 days, men experienced no significant changes in their body composition parameters (**Table 2**). At the same time, women lost on average about 1 kilogram of body weight, 2 centimeters in waist circumference, and 1.5 kilograms in body fat. Their body mass index decreased by 0.5 kg/m^2 and visceral fat area by 4.5 cm^2 (**Table 3**).

After the intervention period of 45 days, there was a significant decrease in total cholesterol (by 16%), LDL cholesterol (by 20%), and triglyceride levels (by 23%) in men, and gamma GT levels dropped by 10% (**Table 4**). In women, there was a significant decrease in total cholesterol (by 18%), LDL cholesterol (by 24%), and triglyceride levels (by 11%), while gamma GT and urea levels dropped by 10% (**Table 5**).

DISCUSSION

The presented study showed a significant decrease in total cholesterol, LDL cholesterol, and triglyceride levels after a 45-day-long supplementation with glucomannan and red rice extract in healthy overweight persons with mild hypercholesterolemia. A meta-analysis comprising 14 studies concluded that the use of glucomannan alone significantly lowers total cholesterol, LDL cholesterol, triglycerides, and body weight, but not HDL cholesterol [10]. Glucomannan was also successfully used in hypercholesterolemic children; an eight-week treatment combined with diet led to significant decrease in total and LDL cholesterol in comparison to diet alone [11]. Glucomannan combined with chitosan was applied in a small study of overweight normocholesterolemic subjects, but at a lower dose (2.4 g/day) [12]. This supplementation was associated with a decrease in total cholesterol, as well as in LDL and HDL cholesterol, but triglyceride concentrations remained the same [12].

The effects of red yeast rice extract on blood lipids were tested in several studies. The supplementation with red rice extract was associated with a decrease in total cholesterol of about 10-15% in the following participants: in healthy subjects with hyperlipidemia in combination with diet after eight weeks [13], in patients who did not tolerate statins or other lipid-lowering agents during a two-month treatment [14], in moderately hypercholesterolemic subjects taking 10 mg monacolins for 4 weeks [15], and in healthy persons treated for 12 weeks with lower dose of the supplement (3 mg monacolin K) combined with 200 μg folic acid per day [16]. The longest study lasting for 24 weeks in which healthy persons with mild to moderate hypercholesterolemia, and mild hypertension took a supplement containing both red rice (10 mg monacolin K) and fiber glucomannan (3 g per day), combined with a diet, showed a significant reduction in total cholesterol level by 20% [17]. A similar result was shown in 8-to-16-year-old children with familial hypercholesterolemia or familial combined hyperlipidemia, who received a dietary supplement containing 3 mg of monacolins, and 10 mg policosanols once a day for 8 weeks. Both total and LDL cholesterol levels were reduced by 20-25% compared with placebo [18].

Furthermore, some of the above-mentioned studies on red yeast rice extracts also reported a concurrent decrease in LDL cholesterol alone by about 15% [16], to 20% [14], to 25% [17], and a decrease in LDL levels accompanied by the decrease in homocysteine [16], C-reactive protein and some markers of inflammation and vascular remodeling [15]. A meta-analysis comprising 20 studies reported a clinically and statistically significant reduction of LDL cholesterol by 1.02 mmol/L compared to placebo but concluded that the effect was not different from statin therapy [19].

Table 1. Baseline characteristics of the participants by gender.

Parameters		Men	Women	p-value
Number of participants		15	16	
Age (years) (Mean±SD)		54.87±6.45	53.56±9.09	0.650*
Physical activity level (Mean±SD)		5.15±1.82	4.63±1.78	0.438*
Education (%)	High school	3 (21.4%)	2 (15.4%)	0.538†
	University	11 (78.6%)	11 (84.6%)	
	Unreported	1 (6.7%)	2 (12.5%)	
Smoking habits (%)	Non-smoker	9 (60.0%)	4 (25.0%)	0.260†
	Ex-smoker	2 (13.3%)	5 (31.3%)	
	Active smoker	3 (20.0%)	5 (31.3%)	
	Unreported	1 (6.7%)	2 (12.5%)	
Alcohol consumption (%)	1-2 glasses per day	3 (20.0%)	3 (18.8%)	0.960†
	Rarely	2 (13.3%)	2 (12.5%)	
	Never	9 (60.0%)	9 (56.3%)	
Number of meals per day (%)	1-2 meals	1 (6.7%)	3 (18.7%)	0.825†
	3 meals	8 (53.3%)	7 (43.8%)	
	4 meals and more	6 (40.0%)	6 (37.5%)	
Anthropometric parameters (Mean±SD)	Height (m)	176.60±5.01	165.19±6.09	<0.001*
	Weight (kg)	94.70±17.62	77.49±12.93	0.004*
	Body mass index (kg/m^2)	30.33±5.40	28.44±4.84	0.315*
	Waist circumference (cm)	109.87±13.39	99.81±13.51	0.046*
	Arm circumference (cm)	33.40±2.69	30.50±2.63	0.006‡
	Total body water (L)	49.96±5.38	35.03±4.04	<0.001*
	Fat-free mass (kg)	67.79±7.22	47.64±5.48	<0.001*
	Skeletal muscle mass (kg)	38.45±4.11	26.21±3.32	<0.001*
	Body fat mass (kg)	26.91±12.19	29.85±9.93	0.467*
	Percent of body fat (%)	27.27±7.94	37.49±9.37	0.003*
	Visceral fat area (cm^2)	146.42±37.34	133.60±44.61	0.394*
Biochemical parameters (Mean±SD)	Fasting glucose (mmol/L)	5.92±0.54	5.73±0.62	0.377*
	Total cholesterol (mmol/L)	6.68±1.22	6.44±0.93	0.538*
	HDL cholesterol (mmol/L)	1.09±0.28	1.47±0.36	0.004‡
	LDL cholesterol (mmol/L)	4.61±1.13	4.34±0.74	0.439*
	Triglycerides (mmol/L)	2.54±1.48	1.39±0.60	0.015‡
	Urea (mmol/L)	5.82±1.50	5.02±1.66	0.140‡
	Creatinine (μmol/L)	87.80±15.89	68.63±9.91	<0.001*
	Uric acid (μmol/L)	386.40±76.01	294.69±56.68	0.001*
	Billirubin (μmol/L)	11.91±3.14	9.85±3.20	0.082*
	ALT (U/L)	32.80±16.46	21.13±8.81	0.006‡
	AST (U/L)	23.47±7.94	19.38±4.87	0.092*
	Gamma GT (U/L)	43.40±38.38	18.94±6.95	0.015‡
	CPK (U/L)	148.13±152.04	88.31±35.59	0.163‡

* Independent samples Student t-test
† Pearson's chi-square test
‡ Mann-Whitney U test

Table 2. Changes in body composition parameters during the intervention period in men.

Body composition parameters	At baseline (Mean±SD)	After intervention (Mean±SD)	Difference from baseline (Mean±SD)	% of difference (Mean±SD)	p-value
Body weight (kg)	94.70±17.62	94.22±17.51	0.48±1.55	0.45±1.66	0.251*
Body mass index (kg/m^2)	30.33±5.40	30.19±5.47	0.13±0.47	0.46±1.56	0.293*
Waist circumference (cm)	110.46±13.99	109.35±15.28	1.12±2.42	1.15±2.29	0.122*
Arm circumference (cm)	33.46±2.90	33.19±3.13	0.27±0.72	0.85±2.28	0.205*
Total body water (L)	49.96±5.38	50.01±5.06	-0.05±1.32	-0.21±2.60	0.878*
Fat-free mass (kg)	67.79±7.22	67.83±6.80	-0.04±1.74	-0.16±2.51	0.930*
Skeletal muscle mass (kg)	38.45±4.11	38.43±3.94	0.03±0.95	-0.01±2.38	0.915*
Body fat mass (kg)	26.91±12.19	26.39±12.09	0.52±1.023	1.97±4.21	0.069*
Percent of body fat (%)	27.27±7.94	26.85±7.81	0.41±1.14	1.41±4.14	0.183*
Visceral fat area (cm^2)	146.42±37.34	144.59±37.72	1.83±6.06	1.22±3.79	0.262*

* Paired samples t-test
† Wilcoxon signed ranks test

Table 3. Changes in body composition parameters during the intervention period in women.

Body composition parameters	At baseline (Mean±SD)	After intervention (Mean±SD)	Difference from baseline (Mean±SD)	% of difference (Mean±SD)	p-value
Body weight (kg)	77.49±12.93	76.23±12.98	1.26±2.08	1.63±2.53	0.029*
Body mass index (kg/m^2)	28.44±4.84	27.99±4.86	0.46±0.73	1.64±2.53	0.025*
Waist circumference (cm)	99.81±13.51	97.94±13.55	1.88±2.33	1.90±2.35	0.006*
Arm circumference (cm)	30.50±2.63	30.12±2.94	0.38±0.72	1.31±2.57	0.054*
Total body water (L)	35.03±4.04	35.19±3.86	-0.16±0.74	-0.56±2.18	0.396*
Fat-free mass (kg)	47.64±5.48	47.88±5.21	-0.24±0.98	-0.61±2.10	0.335*
Skeletal muscle mass (kg)	26.21±3.32	26.35±3.09	-0.14±0.60	-0.67±2.35	0.375*
Body fat mass (kg)	29.85±9.93	28.35±9.89	1.50±2.07	5.37±6.31	0.011*
Percent of body fat (%)	37.49±9.37	36.11±9.28	1.38±1.78	3.74±4.60	0.007*
Visceral fat area (cm^2)	133.60±44.61	129.15±43.65	4.45±5.85	3.06±4.31	0.008*

* Paired samples t-test
† Wilcoxon signed ranks test

Table 4. Changes in biochemical parameters during the intervention period in men.

Biochemical parameters	At baseline (Mean±SD)	After intervention (Mean±SD)	Difference from baseline (Mean±SD)	% of difference (Mean±SD)	p-value
Fasting glucose (mmol/L)	5.92±0.54	5.93±0.79	-0.01±0.71	-0.43±11.97	0.943*
Total cholesterol (mmol/L)	6.68±1.22	5.52±0.88	0.76±0.77	16.36±10.95	<0.001*
HDL cholesterol (mmol/L)	1.09±0.28	1.14±0.29	-0.04±0.13	-5.07±11.78	0.198†
LDL cholesterol (mmol/L)	4.61±1.13	3.53±0.66	1.08±0.93	20.13±19.93	<0.001*
Triglycerides (mmol/L)	2.54±1.48	1.88±1.06	0.66±0.76	23.06±17.90	0.001†
Urea (mmol/L)	5.82±1.50	5.75±1.21	0.07±1.69	-2.57±24.67	0.755†
Creatinine (μmol/L)	87.80±15.89	86.47±15.43	1.33±11.42	0.96±10.16	0.658*
Uric acid (μmol/L)	386.40±76.01	373.60±84.77	12.80±44.33	3.04±11.34	0.282*
Billirubin (μmol/L)	11.91±3.14	14.93±4.22	-3.03±4.47	-32.84±51.18	0.020*
ALT (U/L)	32.80±16.46	32.80±11.68	0.00±9.83	-5.47±28.45	0.683†
AST (U/L)	23.47±7.94	22.87±6.80	0.60±5.08	0.47±17.98	0.655*
Gamma GT (U/L)	43.40±38.38	38.67±32.51	4.73±9.30	10.62±16.41	0.004†
CPK (U/L)	148.13±152.04	119.07±55.60	29.07±125.49	-4.74±49.52	0.977†

* Paired samples t-test
† Wilcoxon signed ranks test

Table 5. Changes in biochemical parameters during the intervention period in women.

Biochemical parameters	At baseline (Mean±SD)	After intervention (Mean±SD)	Difference from baseline (Mean±SD)	% of difference (Mean±SD)	p-value
Fasting glucose (mmol/L)	5.73±0.62	5.69±0.60	0.04±0.66	0.16±11.32	0.795*
Total cholesterol (mmol/L)	6.44±0.93	5.20±0.54	1.24±0.94	18.02±11.73	<0.001*
HDL cholesterol (mmol/L)	1.47±0.36	1.44±0.33	0.02±0.16	0.42±11.84	0.717†
LDL cholesterol (mmol/L)	4.34±0.74	3.25±0.56	1.09±0.84	23.68±15.55	<0.001*
Triglycerides (mmol/L)	1.39±0.60	1.12±0.44	0.27±0.40	11.45±33.11	0.030†
Urea (mmol/L)	5.02±1.66	4.29±1.19	0.73±1.25	11.11±20.04	0.046†
Creatinine (μmol/L)	68.63±9.91	68.13±6.63	0.50±5.43	0.02±7.20	0.718*
Uric acid (μmol/L)	294.69±56.68	293.88±62.14	0.81±33.11	-0.18±12.17	0.923*
Billirubin (μmol/L)	9.85±3.20	11.88±3.89	-2.03±4.18	-30.25±55.31	0.071*
ALT (U/L)	21.13±8.81	21.69±9.44	-0.56±7.88	-6.46±33.44	0.609†
AST (U/L)	19.38±4.87	21.00±8.04	-1.62±5.77	-8.17±25.90	0.278*
Gamma GT (U/L)	18.94±6.95	16.00±4.75	2.94±3.42	12.62±14.38	0.006†
CPK (U/L)	88.31±35.59	130.94±116.51	-42.62±105.08	-45.87±110.25	0.053†

* Paired samples t-test
† Wilcoxon signed ranks test

The effects on triglyceride levels were not so straightforward. While some studies reported a significant decrease in triglycerides [13], others showed no differences [15]. A possible explanation may be related to the fact that the former study included supplement combined with diet for eight weeks, whereas the latter study lasted for only 4 weeks without diet. In the presented study, however, we instructed our patients not to change their dietary patterns so we can attribute our triglyceride-lowering effect to the supplement alone.

On the other hand, most of the above-mentioned studies reported any change in HDL cholesterol levels [13,15,18], similar to the presented results. The only study showing a positive effect on HDL, i.e. an increase of 15% was the study in persons with mild to moderate hypercholesterolemia and mild hypertension treated with a combination of red yeast rice and glucomannan and a diet for 24 weeks [17].

When supplements were combined with lifestyle changes or a lipid-lowering diet, the effects on blood lipids were even more evident. A group of participants already on a diet low in saturated fat and cholesterol was asked to add plant sterols, soy proteins, and viscous fibers from foods and to take lovastatin (20 mg per day) [20]. This dietary intervention led to a significant decrease in LDL cholesterol by almost a third of the indicial value, and the decrease in the ratio of LDL to HDL cholesterol [20]. In another outpatient study, persons with untreated primary hypercholesterolemia were randomized into a group treated with lipid-lowering diet alone, and a group on the same diet combined with a supplement containing 200 mg red yeast rice extract (3 mg monacolins), 500 mg berberine, and 10 mg policosanols [21]. The latter group showed a significant reduction in both total cholesterol and LDL cholesterol (by 30-33%) after 4 weeks of treatment; the obtained values remained unchanged after 12 weeks of study [21]. Another large study was conducted on

patients with mild hypercholesterolemia who refused to take statins or had a history of statin-associated myalgias [22]. Participants took huge doses of red yeast rice (1800 mg twice daily) for one year, and were further randomized into four groups: those taking phytosterol tablets (900 mg twice daily) vs. placebo, or those making a lifestyle change vs. usual care. The main outcome of the study was that all patients had significant decreases in total cholesterol, LDL cholesterol triglycerides, and high-sensitivity C-reactive protein, and an increase in HDL cholesterol when compared with baseline. The greatest effect, however, was shown in those who implemented lifestyle changes compared to the usual care group, whereas those taking phytosterols did not improve their biochemical status compared with placebo [22].

The presented study reports significant decreases in body weight, body mass index, waist circumference, body fat mass, percent of body fat, and visceral fat area in women. The fact that the intervention lasted no more than 45 days could account for the lack of a similar effect in men, as well as for a relatively insignificant weight loss (about 1% of the initial weight). Other studies show controversial results when it comes to weight changes. Weight loss of almost four kilograms was reported following the intake of 1.24 g/day of glucomannan with 250 ml of water, 15 minutes before breakfast, lunch, and dinner over 5 weeks in comparison with placebo [23]. On the other hand, weight loss of less than half a kilogram was reported in participants taking 1.33 grams of glucomannan with 8 ounces of water (about 235 milliliters) one hour before each of the three meals for 8 weeks, which was similar to weight loss in the placebo group [24]. However, a systematic review comprising six randomized control trials confirmed a significant reduction in body weight in healthy obese, or overweight adults after two, four, and eight weeks of intervention [25].

The present study has several limitations. First, the study was small, unblinded, unrandomized and there was no control against placebo. Participants were recruited among patients visiting the nutrition department, i.e. among those who were already seeking advice for increased cholesterol levels, overweight or obesity and thus possibly highly motivated. Nevertheless, we were able to monitor the adherence to supplementation by regular check-ups. Second, we were not able to evaluate the markers of inflammation or endothelial dysfunction. Third, we did not thoroughly monitor participants' renal function, related to the possible presence of citrinin, a nephrotoxin, in some red yeast rice preparations. We were assured by the manufacturer, however, that the product contained no trace of that substance.

Finally, the study cannot be easily generalized to other populations, given the differences in eating habits, physical activity level, and social characteristics. Nevertheless, we are convinced that the participants benefited from the intake of the dietary supplement and continued to use it for the maintenance of normal cholesterol levels in the future.

CONCLUSION

A 45-day intake of a dietary supplement containing glucomannan and red rice extract resulted in a significant decrease in total cholesterol, LDL cholesterol, and triglyceride levels in the investigated population. Furthermore, the supplementation resulted in a small, clinically insignificant reduction in body weight and body composition among women, but not in men. We are confident that the supplement provides a widely available, safe, and effective treatment option for the population of healthy middle-aged overweight people with mild hypercholesterolemia.

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Promene serumskih lipida i telesne mase nakon primene dijetetskog suplementa sa glukomananom i ekstraktom crvenog pirinča u maloj interventnoj studiji

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Kratak sadržaj

Dodatak ishrani koji sadrži kombinaciju glukomanana i ekstrakta crvenog pirinča mogao bi da ispoljava sinergistički efekat u snižavanju nivoa lipida u krvi. Cilj studije je ispitivanje promena nivoa lipida, telesne težine i telesnog sastava kod zdravih prekomerno uhranjenih osoba sa blagom hiperholesterolemijom nakon 45-dnevnog unosa dodatka ishrani koji sadrži glukomanan i ekstrakt crvenog pirinča. Studija je dizajnirana kao intervencija u jednoj nerandomizovanoj grupi. 31 ispitanik je konzumirao dodatak ishrani koji sadrži dijetno vlakno glukomanan (Konjak glukomanan, E425ii, 4 grama) i ekstrakt crvenog pirinča (Monascus purpureus, 1 gram) tokom 45 dana. Telesna težina i telesni sastav ispitanika mereni su svake dve nedelje. Nivo lipida određivan je na početku i na kraju intervencije. Posle 45 dana intervencije došlo je do značajnog smanjenja ukupnog holesterola (za 16-18%), LDL holesterola (za 20-24%) i nivoa triglicerida (za 11-23%) kod ispitanika oba pola. Pored toga, žene su u proseku izgubile oko kilogram telesne težine, 1,5 kilograma telesne masti i smanjile indeks telesne mase. Kod muškaraca, telesni sastav se nije promenio. Upotreba glukomanana i ekstrakta crvenog pirinča rezultirala je značajnim smanjenjem nivoa lipida u krvi kod oba pola. Ovaj dodatak ishrani bi mogao da bude efikasan kod zdravih prekomerno uhranjenih osoba sa blagom hiperholesterolemijom.

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Ključne reči: *dijetetski proizvod; glukomanan; ekstrakt crvenog pirinča; telesna težina; serumski lipidi.*