

New Bulgarian Food Supplement in the Treatment and Prevention of Obesity

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Abstract

The new Bulgarian food supplement consist of the alginic acid salts and antioxidative complex. Our aim is to examine the effect of alginates on the weight loss and BMI in patients with obesity. After six week treatment with alginates significant decrease of the body weight and BMI ($p < 0,01$) is established in comparison to the control group. Alginates assures a mechanical satiety. The food supplement possesses a good temperance and lack of side effects. Our results demonstrate that Bulgarian food supplement alginates inhibits the development of the obesity in male Wistar rats. In addition, alginates has the capacity to reduce the hyperglycemia and hypertriglyceridemia. Moreover, the product did not present side effects in rats.

Keywords: Obesity; Bulgarian Food Supplement; BMI

Introduction

Overweight and obesity are very common diseases around the globe, and prevalence continues to increase in most countries.

Obesity is a chronic metabolic diseases characterized by accumulation of excessive fat mass and disbalance between the energy input and the energy output. It leads to many co-morbidities and high prevalence of mortality [1]. The incidence of obesity and related diseases increases constantly [1,2]. The role of the food supplements in the treatment and prevention of obesity has been discussed [3-5].

Overweight and obesity are wide spread disease not only in the countries with high standard of leaving, but in the countries with lower standard [2]. According to the Bulgarian Statistical Institute more than 60% of adult Bulgarians are overweight (BMI > 25 kg/m²) and 24% are obese (BMI > 30 kg/m²) [2]. That means that over 1 150 000 persons in Bulgaria have to take measures lowering their weight. Prolonged obesity is favourable condition for genesis of cardiovascular diseases [6], stroke [6] diabetes type 2 [3] and cancers [3]. For the treatment of obesity are used: diet [7], increased physical activity [8,9] and drugs [4,5,10,11]. Drugs for treatment of obesity have to be effective in weight reduction, well tolerable and without side effects [1,12].

For obesity, BMI is considered above 30, BMI in overweight is between 25 - 30 and BMI values between 18 and 25 are considered for normal condition. BMI is equal to body weight (kg) divided into the height in squared meters [6,8,9,12].

The new Bulgarian food supplement (Algigracil, AdvancePharma, Sofia, Bulgaria) consist of the alginic acid salts and antioxidative complex. One dose (one sachets) contains highly purified alginates (compounds of alginic acid 1, 2 mg from North Sea), Vitamin E 30 mg,

Vitamin C 60 mg and beta-carotene 3 mg). Dissolved in water and taken in 20 - 30 seconds, alginates turn into gel in the stomach, which remains there for 2 - 3 hours and brings forth a sense of repletion.

The role of the alginate products in the treatment and prevention of obesity has been discussed.

Aim of the Study

To examine the effect of alginates on the weight loss and BMI in patients with obesity.

Clinical Study

Materials and Methods

One hundred twenty patients with obesity were examined. They were divided into two groups. Control group (28 patients (12 men and 16 women), age (28,2 ± 42,1 years), BMI (30,1 - 38,9) kg/m²), the obesity were treated only with diet for 6 weeks. Test group (92 patients (24 men, 68 women), aged (29 - 44.3 years), BMI (30 - 39,2 kg/m²).

Two groups are on diet regime and consuming 1640 calories daily, including 99 grams proteins in duration of 6 weeks at the sanatorium in Kiten on Black Sea.

The test group except diet, receiving alginates - 2 sachets (one sachet before breakfast and second one before dinner), dissolved in water.

Anthropometric indexes were measured as follows - body weight (kg) and BMI (kg/m²). The waist to hip ratio was also calculated. The percentage of the fat mass and fat free mass were determined by a bioimpedance apparatus Tanita 420. Anthropometric indexes were measured as follows: (each first and fourth day of the week).

Total cholesterol, HDL-cholesterol, LDL-cholesterol and triglycerides were measured in human plasma. All tests were made at the beginning and in the end of the study.

Data were statistically analysed by SPSS, v.16. The statistical significance was set at p < 0.05.

Research was made in terms of a double blind trial. For proceeding the results variation statistical analyse was applied.

Results

The results of the study on the body mass and BMI (kg/m²) after 6 weeks are presented on the table 1.

	Body mass (kg)	P value	BMI (kg/m ²)	P value
Test group	- 8,10	< 0,01	- 2,84	< 0,01
Control group	- 4,22		- 2,14	

Table 1

After 6 weeks treatment of the study group with alginates we did not find side effects.

	Body mass (kg)	BMI	Waist to hip ratio	Fat mass %	Fat mass (kg)	Fat free mas %
Before the study	94,6	33,12	0,88	36,2	34,2	63,8
After the 6 weeks	86,5	30,28	0,80	33,3	28,8	66,7
	p < 0.01	P < 0.01	p < 0.05	p < 0.05	p < 0.05	< 0.05

Table 2: Change in anthropometric characteristic and body impedance characteristics before and after the study.

Moreover, the results showed significant reduction in all lipid parameters (Table 3).

	Total cholesterol (mmol/l)	HDL	LDL	Triglycerides
Before treatment	6.64	1.08	4.1	2.3
After 6 weeks	6.02	1.06	3.2	1.7
	p < 0.05	p < 0.05	p < 0.05	p < 0.05

Table 3: Changes in lipid parameters (mmol/l) before and after the study.

Alginates was very well tolerated by our subjects. No side effects were reported.

Experimental Study

Materials and Methods

A total of 48 male Wistar rats (200 - 220g) were used. Rats were randomized into 4 groups. In the first group, rats were fed with a standard chow diet (controls); in the second group rats were fed with standard chow plus alginates; in the third group rats were fed with a high-fat diet, containing mixture of various nuts plus standard chow food (experimental obesity); the fourth group was fed with a high-fat diet, chow food and alginates. All the groups were fed for a 3-week period. Alginates were given once a day (0.5 ml/100g). Food intake was determined daily; body weight was measured at the end of each 3 days. At the end of the study rats were anaesthetized and blood was collected. Epididymal fat tissue and various organs were removed and weighed. Blood specimens were taken for biochemical analyses. Plasma ghrelin concentrations were examined by ELISA methodology (LincoResearch in pg/ml.)

Results

Alginates affected the development of obesity and the parameters of carbohydrate and fat metabolism in rats. A decrease of plasma lipids and glucose in groups treated with Alginates was determined. Those results correlated with a significant decrease of pancreas weight in rats. The group treated with alginate acid showed a significant reduction of body weight and BMI. Alginates reduced the weight gain (27.5%) in the fourth group (experimental obesity plus alginates), compared with the third group (experimental obesity). Moreover, there were changes in the blood levels of ghrelin between those treated with/without alginates. The intake of alginates decreased plasma levels of ghrelin and body weight in rats with obesity.

Discussion

The effect of the food supplement is based on the property of the alginates (organic acid originating from kelp) to produce gel in the gastric juice which is insoluble and hard assimilated by organism. Alginates reduced absorption by human organism from food substances of high caloric content and promote a weight loss and protect obese subjects against weight increase or fat accumulation.

Measurement of waist circumference (respectively waist to hip ratio) is an indirect indicator of the amount of fat accumulated in the abdominal cavity and show availability of diabetogenic and atherogenic android obesity.

Our study demonstrates reduction of the ratio between waist to hip ratio due to decrease of circumference of the waist and altogether with reduction of fat mass (respectively increase of fat free mass) and favorable improved lipid parameters show the importance of alginates in the treatment and prevention of obesity, diabetes type 2 and cardiovascular diseases. In our study we have demonstrated that alginates group has significantly lower plasma levels of ghrelin, compared to the control group. We speculate on the hypothesis that alginates acting in the stomach inhibits the secretion of ghrelin. Most changes in the ghrelin secretions could be as a result of interaction between the alginates molecules and the ghrelin receptors in the stomach. Further investigations are needed to examine the mechanisms of actions between alginates and ghrelin.

The beneficial effect of alginates on ghrelin could be possibly explained by its mechanical effect on the stomach mucosa, and thus on the ghrelin secretion [2].

The vitamins (Vitamin E: 30 mg, Vitamin C: 60 mg and beta-carotene: 3 mg) contained in the preparat (Algigracil). Studies of alginates are performed by Paxman and partners [7,12] and by Solah and partners [13].

The vitamins contained in alginates are properly selected and contribute to prevent degenerative vascular changes thus postponing unpleasant aging conditions. When talking about food additives a balanced proportion among the three antioxidants vitamins should be sought. This proportion is referred to in the preparation ingredient list. These vitamins of highest antioxidant capacity reduce the oxidation stress level thus contributing to keeping the cell physiological functions. The damage caused by the free radicals is mostly related to the lipid peroxidation - a major factor to atherogenesis and coronary disease, and here we come to the great importance of the antioxidant action of the vitamin included. Besides, alginates has an antacid effect.

Our results contribute to the understanding of the mechanisms of obesity and the role of different therapeutic strategies, i.e. diet and alginate therapy, in the balance of the hormonal control of appetite and metabolism.

Conclusions

1. After six week treatment with alginates significant decrease of the body weight and BMI ($p < 0,01$) is established in comparison to the control group. Alginates assures a mechanical satiety. The food supplement possesses a good temperance and lack of side effects.
2. The results demonstrate that Bulgarian food supplement alginates inhibits the development of the obesity in male Wistar rats. In addition, alginates has the capacity to reduce the hyperglycaemia and hypertriglyceridemia. Alginates assures a mechanical satiety. Moreover, the product did not present side effects in rats.

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