

# Substantiation of the Use of Meat-Based Specialized Products in Nutrition of Patients With Arterial Hypertension

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## ABSTRACT

The paper reflects the leading causes of the development and prevalence of arterial hypertension in the population, shows the ways of alimentary correction of nutritional status disorders in patients with arterial hypertension, substantiates the possibility and effectiveness of using specialized meat products in the nutrition of patients with arterial hypertension.

**Keywords:** nutrition of patients, arterial hypertension, specialized meat products

## 1. INTRODUCTION

According to the WHO data, cardiovascular diseases cause 17 million deaths per year; with that, 9.4 million patients die from complications of arterial hypertension [1, 2]. There are 1.13 billion patients with AH in the world, and more than 150 million people in Central and Eastern Europe. The prevalence of arterial hypertension in the Russian Federation is 30–45 % (24 % among males and 20 % among females) and increases with age achieving more than 60 % in individuals over the age of 60. Arterial hypertension is still the leading modifiable cause of both cardiovascular and total mortality. According to the definition of the WHO expert committee, arterial hypertension is constantly elevated systolic and/or diastolic arterial pressure (140/90 mmHg and higher) [1, 2, 14].

At the same time, among alimentary factors leading to the development and progression of hypertonic disease in genetically (hereditary) predisposed people, of fundamental importance are excess calories intake. Excess energy calories intake facilitates obesity and dyslipidemia, as well as excess salt intake, magnesium deficiency, excessive coffee and alcohol use. For example, among patients with obesity (depending on its type and severity), arterial hypertension is found 3–5 times more often compared to people with normal body weight. Taking into consideration population ageing and frequent co-pathology in patients with arterial hypertension, the use of multiple pharmaceutical drugs on this background can lead to polypragmasy, when a risk of unpredictable interactions increases by 1.5 times and a probability of the

development of side effects increases by 10 %. This process creates a necessity to develop alternative, non-drug technologies, including modification of the alimentary component for treatment and prevention of arterial hypertension [3].

This work aimed to substantiate addition of specialized functional foods into the complex rehabilitation prophylactic programs for patients with AH irrespective of an etiological factor that caused the arterial hypertension development. Of particular importance this study has for the stage of medical support (hospital-sanatorium- clinic) to restore the disturbed metabolic status of patients in order to improve the control indices for the AP level and increase the life quality of patients with arterial hypertension.

## 2. MATERIALS AND METHODS

The clinical effectiveness of the specialized product for enteral nutrition "Enmeat-beef" was assessed based on the clinic of the Federal Research Center for Nutrition, Biotechnology and Food Safety in a diet of patients with a syndrome of the operated stomach. The use of meat containing canned foods for enteral nutrition in a diet was accompanied by the reliable reduction of heaviness in epigastrium (from  $1.8 \pm 0.8$  to  $1.4 \pm 0.6$  points,  $p < 0.05$ ), an increase in all indices of the body composition, normalization of elevated arterial pressure, positive dynamics of protein metabolism indices: the haemoglobin level (from  $119.2 \pm 9.6$  to  $122.6 \pm 6.8$  g/l,  $p > 0.05$ ), protein and albumin in blood serum; the tendency towards

increasing of a psychic component of life quality (+4.2 %) was revealed [19].

### 3. RESULTS

The accumulation of the large evidence is based on regarding multiple non-drug measures, and pharmaceutical drugs in reduction of arterial pressure. However, its control both in Europe and worldwide remains to be unsatisfactory. In this connection, early detection of patients with arterial hypertension, effective disease prevention, including modification of diets for patients with AH by incorporation of functional, specialized foods and food additives are a vital part of the state strategy in public health in the Russian Federation [4].

The development of clinical recommendations "Arterial hypertension in adults" allowed standardization of approaches to arterial hypertension therapy [1]. This approach includes the active use of non-drug methods and means in complex treatment and preventive programs, which are linked mainly with changes in the patient's lifestyle. Arterial hypertension treatment includes changes in lifestyle and pharmacological therapy. Many patients require drug therapy, but changes in the lifestyle are of vital importance. They can prevent or delay the arterial hypertension development, and reduce the cardiovascular risk. They can delay or eliminate the necessity of pharmacological therapy in patients with arterial hypertension of the 1st degree, enhance the effects of antihypertensive therapy. However, changes in the lifestyle should never become a reason for postponing pharmacological therapy in patients with high cardiovascular risk. The main drawback of non-drug interventions is low patients' commitment to adhere to them and its reduction over time [1, 5].

In the recommendations of 2019, the experts indicated the united level of evidence. For example, patients with arterial hypertension are recommended to make the following changes in the lifestyle:

1. Reduce salt consumption to 5 g per day (IA). In many countries, the standard salt consumption is 9–12 g/day (80 % of consumed salt is the so-called "hidden salt"). Reduction of its consumption to 5 g/day in patients with AH leads to the reduction of systolic arterial pressure (SAP) by 4–5 mmHg. An effect of sodium reduction is pronounced in elderly patients, patients with diabetes mellitus, metabolic syndrome and chronic kidney disease.

It is necessary to note that in patients with arterial hypertension, strict and long-term restriction of edible salt in nutrition is undesirable as changes in water-mineral turnover and the emergence of "salt hunger" are possible. This process, in turn, can stimulate the sympathetic nervous system, reducing a positive effect of prudent salt restriction on arterial pressure. Moreover, the symptoms of sodium and chloride deficiency in the body (muscle weakness, loss of taste sensations, appetite suppression and others) are possible [6–8].

2. To improve metabolic indices, all patients with arterial hypertension are recommended to increase

consumption of plant foods, including vegetables, fresh fruit and cereals, nuts (they contain potassium, calcium and have the pronounced prebiotic activity), low-fat dairy products (they contain calcium, phosphorus, magnesium), fish and olive oil (sources of omega polyunsaturated fatty acids, and to reduce consumption of animal fats). The experts especially emphasized the necessity to increase the consumption of olive oil. Patients with arterial hypertension are recommended to eat fish not less than two times a week and 300–400 g of fresh vegetables and fruit per day [9, 0].

3. It is necessary to control body weight, avoid obesity (body mass index (BMI) >30 kg/m<sup>2</sup> or waist circumference more than 102 cm in males and more than 88 cm in females), maintain healthy BMI (20–25 kg/m<sup>2</sup>) and waist circumference (less than 94 cm in males and less than 80 cm in females) to reduce AP and the cardiovascular risk (IA). According to the meta-analysis data, an average reduction of systolic (SAP) and diastolic (DAP) arterial pressure on the background of a bodyweight reduction by 5.1 kg was 4.4 and 3.6 mmHg, respectively. Both excess body weight and obesity are associated with an increase in the risk of cardiovascular diseases and total mortality. A reduction of body weight is recommended for patients with arterial hypertension having excess body weight and obesity to control metabolic risk factors; however, weight stabilization can be a prudent goal for many people. According to the data of Prospective Study Collaboration, the level of mortality is minimal at the levels of BMI in a range of 22.5–25 kg [11, 12].

4. It is necessary to restrict alcohol consumption to 14 units per week for males and to 7 units per week for females (one unit is 125 ml of wine or 250 ml of beer) (IA) and avoid chronic abuse [13, 14].

Consideration of food as a compound chemical complex that contains thousands of major and minor components with various physiological effects on the body allows using individual components of a diet or a diet in general, as well as products with the targeted chemical composition to restore impaired biochemical adaptation [9].

According to the results of the study of the Federal Research Center for Nutrition, Biotechnology and Food Safety, the diets of the Russians contain an excessive amount of saturated fats, starch-containing products (potato, flour-based food and cereals) and easy-to-digest carbohydrates on the background of insufficient consumption of meat, fish and dairy products – sources of full-value protein; vegetables and fruit containing deficient vitamins, minerals and dietary fibres:

- protein deficiency of up to 15–20 % of the recommended values of daily consumption among population groups with low income;
- omega-3 and 6 PUFA deficiency on the background of the excessive consumption of saturated fats;

- vitamins C and D deficiency in 90 % of the population;
- B vitamins and folic acid deficiency in 60–80 %;
- deficiency of fat-soluble vitamins – antioxidants A, E, K and beta-carotene in 50–60 % of population;
- deficiency of fibre and pectin – 2 times lower than the recommended daily requirement.

Due to this, at present, 60 % of the Russians live in the conditions of maladaptation, 10 % have risk factors for the development of the primary non-infectious diseases, 25–27 % are ill, and only 3–5 % are healthy [15]. The revealed disorders of the nutritional status significantly reduce the effectiveness of treatment measures, increase risk of septic and infectious complications, lead to a growth in resource consumption in public health, including increased costs of patient treatment and duration of their stay in an inpatient facility, and also worsen the mortality indices. Long-term malnutrition can lead to various changes based on alterations in cell metabolism associated with the damage of the genetic apparatus or insufficiency of essential food components or their excess. The causes for this are an impact of environmental eco-pathogens, modern intensive food production technologies, the use of pharmaceutical drugs that induce “pharmacological” malabsorption, which aggravates the deficiency of essential nutrients. The leading cause of the significant harm to human health is a disorder of the nutrition structure. The modern approaches to diet therapy are based on the main provisions of the concept “Optimal nutrition of the Russian population” [16].

It is quite challenging to solve the problem of malnutrition using standard dietary menus as the actual intake by a patient is not higher than 60 % of the total caloric value of a calculated dietary menu. Introduction of specialized, functional foods and food additives into diets for their optimization, is etiopathogenetically reasonable as they have the declared, balanced composition in terms of the main essential macro- and micronutrients and optimal assimilability on the background of minimal enzymatic and energy expenditure. The main criteria for inclusion of one or another functional and specialized product in the rehabilitative-prophylactic programs should be the following:

1. These products should have systemic physiological action; that is, facilitate the restoration of disordered functions of several body organs and systems;
2. Products should have optimal metabolic effects on the body; that is, have the detoxification, reducing and additive properties;
3. Products should be safe; that is, correspond to the epidemiological and hygiene requirements for this product category.

## 4. DISCUSSION

The specialized product for enteral nutrition “Enmeat-beef” (TS 10.86. 10-075-00419779-2015), which was developed by the Gorbatov Research Center for Food Systems, corresponds to the all requirements mentioned above. The volume of a product package is 190 ml. The product represents the ready-to-eat, full-value, sterilized mixture in the form of homogeneous liquid mass with the balanced nutrient composition, vitamin-mineral premix. It is intended for the use as a specialized product for enteral nutrition in different pathological conditions accompanied, first of all, by malnutrition and other disorders of the nutritional status. The composition includes the following components: water, beef, maltodextrin, rapeseed oil, sucrose, soybean oil, soybean isolated protein, soybean lecithin, stabilizer,  $\beta$ -carotene, iodine casein, vitamins B1, B2, PP, B6, B12, C, A, D3, E, pantothenic acid, folic acid, biotin, sodium chloride, magnesium (chloride), iron, zinc and copper (sulfates), selenium (sodium selenite), manganese (chloride), potassium (phosphate), calcium (carbonate), sodium and potassium (citrate) [22]. The fatty component of the mixture is presented by a combination of fat from meat raw materials, which contains mainly saturated fatty acids, and a mixture of rapeseed and soybean oils. These components provide an intake of monounsaturated and polyunsaturated fatty acids. A ratio of oils (3.5 % of rapeseed oil and 1.0 % of soybean oil) was selected in such a way as to ensure intake of omega-6 and omega-3 PUFA in a ratio of not higher than 5:1 [26–28].

## 5. CONCLUSION

The balanced composition of the specialized product for enteral nutrition “Enmeat-beef” contains all essential elements for human nutrition. This balanced composition allows recommending the nutrition of patients with arterial hypertension manifested as an isolated nosology. Also this balanced composition is recommending for the nutrition of patients, when arterial hypertension is diagnosed as a comorbid pathology (morbid obesity, diabetes mellitus, atherosclerosis, diseases of the digestive system). This balanced composition facilitating rapid compensation of the disordered nutritional status, reducing the duration of patients’ stay in healthcare facilities and preventing the development of disease recurrence. A product can be consumed as an addition to the main diet (for example, in protein-energy deficiency) and instead of 1–2 meals upon excess weight or obesity with 190 ml at a single time. Also, this product can be used in the nutrition of healthy patients, whose condition requires increased protein supply (children and adolescents, elderly patients of gerontologic units, pregnant and breastfeeding women, sportsmen) and also in the nutrition of general population with an active lifestyle.

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