Developing Healthy Diet Recommendations for Various Groups of People

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Abstract. This article presents a review of the current diets of various groups of people from schoolchildren and college students to the elderly, as well as the opportunities for the organization of sports nutrition. It also lists the principles of secondary school catering, the specific features of students' diets, and the dinner arrangements for the elderly.

The authors review resources on sports nutrition in Russia because people of various age groups became more interested in a healthy lifestyle, sports, healthy eating, and, as a consequence, healthy food. The article presents a wide review of the nutrition products for the elderly, sportspeople, and students.

The article covers the entire range of nutrition problems various groups of people face, including schoolchildren, college and university students, elderly, and sportspeople.

The authors provide the workings of the department of the restaurant business of the Plekhanov Russian University of Economics devoted to the organization of healthy eating for various groups of people and the recommendations on diets.

1. Introduction
Currently, the society pays a lot of attention to providing people with healthy food to improve the demographic situation. To this end, various regulatory documents and recommendations are being developed at the state and international levels that aim to support people's health and focus on nutrition as one of the key factors in human health. Besides, scientists develop balanced diets for various groups of people [1, 2].

2. Relevance
This article considers the nutrition of various groups of people, including schoolchildren, college and university students, and the elderly, as well as the prospects of sports nutrition in terms of promoting health and sports among the population to ensure well-being in senior age and active longevity. The problem of healthy nutrition is one of the main challenges and pressing problems of today, and, like the health of the population, it receives special attention from the government.

Nutrition must help protect people from the adverse effects of the surroundings.

An often-quoted saying that “we don’t live to eat but we eat to live” describes eating as consuming biological components.

To achieve longevity, people must eat rationally and stick to the principles and standards of a healthy lifestyle.

Diets and nutrition standards are developed for various groups of people in order to achieve the best living and working efficiency with a view to the physiological standards and needs.

The goals of a healthy nutrition program in secondary schools:
providing children and teenagers with food complying with the physiological needs in energy, nutrients, as well as rational and balanced diet principles, characteristic of their age;
- ensuring the quality and safety of catering practices and products used;
- preventing infectious and non-infectious diseases related to nutrition among children and teenagers;
- promoting the principles of healthy and adequate nutrition;
- arranging education and awareness-raising activities about healthy eating;
- ensuring the accessibility of school catering;
- adjusting the facilities in school cafeterias to comply with the current developments and technologies.
- ensuring sanitary-and-hygienic safety of catering, including the compliance with the requirements for food units, products supplied, as well as their transportation and storage, cooking and serving;
- promoting awareness about healthy nutrition for schoolchildren among parents;
- improving the system of school catering funding system; cost optimization, including budgetary transfers;
- arranging social catering

The development of diets for healthy senior people is based on the following key principles:
- energy balance;
- antiatherosclerotic action;
- highest possible diversity of food, and the balance between all the essential nutrients;
- provision of elements stimulating enzyme system activity in the human body;
- the use of products and dishes that are easily fermented by enzymes.

3. Problem statement
The authors aim to develop diets for various groups of people, including those leading an active lifestyle, e.g., sportspeople, which would satisfy people's needs in nutrients depending on their age and type of activity.

The department of the restaurant business of the Plekhanov Russian University of Economics has been studying the problems of quality formation for public catering products through adjusting food source parameters, proportioning animal and vegetable origin ingredients, food fibers, aromatic additives, vitamin products, etc. This facilitates the flexibility of recipes (M. A. Belyayeva, 2015, 2016) to satisfy the physiological standards and needs of various groups of people.

The development of breakfast and dinner sets was based on the approximate distribution of daily calorific intake (%) for 4 meals a day: 25% breakfast, 35% dinner, 15% afternoon snack, 25% supper. For 5 meals a day, the proportion is as follows: 20% breakfast, 10-15% brunch, 30-35% dinner, 10-15% afternoon snack, 20% supper.

4. Examples of complete breakfast and dinner sets developed
These sets were developed for college and university students aged 18-30. The dishes were selected according to students’ preferences and national traditions. The main focus is on hot main courses because they have higher calory values. Besides, we calculated the prime costs for the dishes (Table 1). Table 2 presents a model one-day menu for females over 60 years of age.

| Table 1. Complete set menus for students, both male and female. |
| --- |
| **Breakfast: 600 kcal** |
| Dish | Weight | Energy value | Proteins | Fats | Carbohydrates | Prime cost |
| --- | --- | --- | --- | --- | --- | --- |
| Cottage cheese pudding with sour cream | 150/25 | 249 | 18.64 | 11.48 | 16.1 | 42 |
| Dish                              | Weight, g | Energy value | Proteins, g | Fats, g | Carbohydrates, g | Prime cost |
|----------------------------------|-----------|--------------|-------------|---------|-----------------|------------|
| Butter and kashk sandwich        | 30/10/25  | 218          | 8.66        | 13.34   | 15.78           | 33         |
| Boiled egg                       | 60        | 93           | 7.52        | 6.34    | 0.67            | 11         |
| Green tea with sugar              | 200       | 40           | 0.02        | 0       | 10.56           | 5          |
| **Total**                        | **600**   | **34.84**    | **31.16**   | **33.11**| **91**          |            |

- Dinner: 1080 kcal

### Table 2.
The suggested one-day menu for females over 60 years of age.

| Meal       | Dish                                      | Weight, g |
|------------|-------------------------------------------|-----------|
| Breakfast  | Oatmeal with milk                         | 200       |
|            | Beet and apple salad                      | 100       |
|            | Bran crackers                             | 20        |
|            | Tea with milk                             | 200       |
| Dinner     | Vegetarian borshch                        | 250       |
|            | Ground chicken cutlet                     | 70        |
|            | Mashed squash                             | 100       |
|            | Cod liver salad                           | 100       |
|            | Apple compote with lactulose              | 200       |
| Afternoon snack | Pear                                       | 200       |
|            | Kefir (2.5% fat)                          | 200       |
|            | Wholegrain oat cookies                    | 20        |
| Supper     | Curd fritter                              | 150       |
|            | Cocoa                                     | 200       |
|            | Cookies                                   | 25        |
As noted above, people of various ages became more interested in a healthy lifestyle due to the government programs aimed at improving the quality of life, promoting fitness, sports, and active longevity in the Russian Federation. This preconditioned the increased interest in healthy eating and, consequentially, to sports nutrition products.

5. Development prospects for sports nutrition

The sports nutrition market in Russia is far from being saturated. Moreover, between 2013 and 2018, the offer in the sports nutrition market in Russia reduced by approximately 8%. Within this period, the reduction amounted to 1030 tons (from 12,170 to 11,140 tons). The analysis of publication shows that the most significant offer drop happened in 2015: 14.2% compared to the previous year. This was caused by the embargo on some products from the EU countries, the USA, Canada, Australia, and Norway imposed in the middle of 2014, since these countries have long been the main suppliers of quality sports nutrition to the Russian market [6]. As a result, the legal import of sports nutrition products reduced by large, and the increase in domestic production and black marketing could not compensate for the offer drop in the market.

Today, the Russian market of sports nutrition features both domestic and foreign products that have not been banned since 2014. Imported sports products and additives are considered to be of better quality because Russian-made products sometimes lack some of the components stated on the labels, according to the research performed.

Sports nutrition primarily needs functional and bioactive components, such as proteins, peptides, and amino acids.

The development of sports nutrition products is based on research in the following areas: dietary science, nutritional physiology, biochemistry, nanobiotechnology, etc. Sports nutrition also relies on studies in integral sciences, like genomics, metabolomics, and proteomics [15].

According to the regulations, sports nutrition stands for specialized food products with a preset chemical constitution that ensures increased nutritional value and/or directional effectiveness. Sportpeople nutrition may be comprised of a set of products or specific types of products. Its purpose is to help people adapt to physical and neuropsychic pressures [6].

When developing menus for this group, it must be understood that special foods and additives are supposed to complement the main ration and cannot replace it.

The majority of physiologically functional and bioactive additives used in sports nutrition are made of natural raw materials, e.g. milk, soy, chicken eggs, meat, occasionally byproducts, chain tissue, etc. Modern technology is used to ensure that the additives have high consumer parameters, including organoleptic characteristics [8].

Sports nutrition may have a selective effect on metabolism at various periods of sporting activities, depending on the type of sport, athlete's qualification, gender, age, and other individual features. The requirements and goals of using bioactive additive may include eating between training sessions and during them, tapering (e.g., glycogen suprcompensation for bodybuilders), the acceleration of recovery after competitions, regulating salt and water metabolism, body mass correction, thermoregulation, adjusting imbalanced diets [6, 8, 14].

Sports nutrition also contains antioxidants, vitamins, and oils saturated with omega-3 and omega-6 fatty acids. The content of these substances in pharmacy-sold bioactive additives is lower than in sports supplements, and the price of pharmacy-sold BAAs is higher. We must note that the production of sports nutrition is regulated by technical guidelines, national standards, and other reference documents [8].

1 Ye. S. Zaytseva, Ye. E. Klein, A. Yu. Sokolov. The current state of the sports nutrition sector (unpublished article)
Sports nutrition products are usually classified as proteins, including proteinoids (collagens), amino acids, creatines, gainers, fat burners, Zink Magnesium Aspartate (ZMA) supplements, etc. [6].

Casein is the main milk protein absorbed within 5-7 hours. It should be consumed before going to sleep so that it could support recovery and muscle growth throughout the night by providing the nutrients a body needs. This protein might also have anticatabolic properties and it can stabilize the immune system [9].

Soy protein is often used in diets, especially the vegetarian ones. It contains glutamine, arginine, and branched-chain amino acids (BCAA) that can easily incorporate into the muscle tissue. Soy protein can be consumed before or after training. It can also be consumed throughout the day to provide the body with the necessary amounts of proteins. It is not recommended, however, to use it before sleep. Whey protein isolate is extremely efficient because it can be quickly ingested. It can be consumed when the body lacks proteins as a result of sporting activity [9].

Dairy protein isolate includes such components as casein and whey protein. This type of protein is rich in amino acids. It is normally used together with other protein sources.

Gainers are special nutritional supplements that contain a lot of protein with some carbohydrates. Gainers may contain vitamins, minerals, and creatine. Consumption patterns for these substances differ, but the latter components are most efficient if taken an hour or an hour and a half before strength training.

Fat burners are special food additives for the quick breakdown of subcutaneous fat through the reduction of appetite. They may include various weight reduction components like caffeine and diuretics [9].

ZMAs contain large amounts of vitamin В₆, magnesium, and zinc, which impacts the production of testosterone, thus facilitating muscle growth [13].

To improve the nutrition of sportspeople, their diets can be complemented with products with improved formula and consumer properties. According to the research institute for sports medicine (RSUPESY&T), athletes daily receive about 760-820 kcal from bakery products because those are easily available and ingested. We deem it feasible to develop technology, including recipes, for this type of product taking into account the medical and biological requirements for athletes’ nutrition.

One of the ways to improve athletes’ nutrition is the introduction of velvet antler industry products to their diets. These include pantocrine (generic immunostimulator) and especially pantohematogen. The raw material for the production of pantohematogen is fresh velvet antler deer (Siberian stag) blood partially defibrinated and dehydrated under mild conditions with further drying and pulverization.

Numerous research works confirm that the use of pantohematogen and its products has a great impact on the preparation, performance, and recovery of sportspeople [15]. We can mention the following positive changes due to the consumption of pantohematogen: increased cardiovascular system reserves and the subsequent increase in its running duration, decreased amounts of lactic acid formed in muscles, and the reduction of the overtraining effect, as well as the preservation of glycogen stores in the liver, muscle and heart, which helps increase the recovery rate after physical exercise and decrease the levels of stress experienced by athletes during competitions [9].

Bioactive polypeptides, represented by molecule fragments of up to 10 kDa, are of huge practical interest [10]. A potential source of such peptides is the by-products of the fishery, such as sardine and sardinella backbones, heads, and scales. These materials are virtually unused in the food industry but it may amount up to 50% of the fish weight at the production floor [10].

As of today, the unique biological activity (anabolic, antioxidant, antiseptic, immunostimulating, hypotensive, regenerative, ergogenic, etc) of marine peptides is beyond doubt. Bioactive substances can be extracted from the by-products through the hydrolysis of native tissues resulting in the breakdown of protein polypeptide chains to low molecular weight proteins and the production of specific organic components. The most effective methods of protein isolation from marine by-products and their transfer to active low molecular state include enzymic and enzymic-thermal hydrolyses. The highest content of proteins with minimum fats and the best proportion of minerals can be obtained
in the hydrolysates of fish scales. Dehydrated hydrolysates have virtually no smell of fish, are very loose and persistent (up to two years at room temperature). The end-product is rich in natural functional ingredients, it is highly digestible and hearty, which makes it perfect for athletes involved in speed and strength sports [16].

Currently, the department of the restaurant business is researching the opportunities to introduce food supplements, including the marine products, into food products and athlete diets to enrich them with macro- and microelements and nutrients.

Summing up the abovesaid, sports nutrition is very important for certain groups of people. It is an integral part of professional athletes’ lives, as well as those who train for fitness rather than records, and those participating in active longevity program, etc. Besides, some elements of sports nutrition can be useful for ordinary people because they can help to cope with the lack of vitamins and biological components that the human body cannot synthesize through making good for their shortfall.

A relatively wide range of products on the sports nutrition market helps satisfy various consumer demands. The choice of a specific product can be determined by various factors: type of sport, athlete’s qualification and training intensity, goals people chase when they start consuming sports nutrition, and, finally, people’s financial means. Even though the Russian market of sports nutrition was not saturated and it mostly comprised imported products, the offer in it today is still lower than the figures of the pre-crisis year of 2014.

**The practical significance** of the developed principles and diets lies in the recommendations concerning rational nutrition, and their deployment at the catering units of the Plekhanov Russian University of Economics featuring sports cafes. The department cooperates with various secondary education institutions where the results of this research can be applied.

6. Conclusions
We believe that it is important to introduce and promote the principles of healthy nutrition and develop diets for various groups of people taking into account their physiological needs. Healthy nutrition, which is the goal of the developed and suggested diets, shall provide people of all age groups with the necessary macro- and microelements, and biological components necessary to support physical activity, emotional and psychological state, and a harmonious lifestyle.

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