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Practical Aspects of Creating New Preventive Grain Bars

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Abstract
When long breaks occur in food intake, as well as pre-workout, restorative nutrition and additional energy supply to the body during intense physical activity, athletes and many people in their daily life use foods that are similar in form of release and partially in function to traditional chocolate bars. According to their functional characteristics, such products are divided into three main groups - energy, high protein and grain bars. The main purpose of energy bars is to provide the human body with a source of additional energy, especially in situations where significant physical and mental endurance is required. The task of high protein sports bars is to provide the human body with building materials for the restoration of muscle tissues, which are actively damaged during intense physical exertion, as well as for the start of muscle tissue growth. Grain bars can help lower blood sugar levels, which can arise from consuming large amounts of fast carbohydrates in a daily diet, and improve the functioning of the digestive system. All these products additionally enrich the body with biologically active substances that are vital for athletes. The synergistic interaction of the functional ingredients in the composition accelerates the recovery of physical strength during and after fitness sessions. The ergogenic properties of the developed food product were confirmed by control tests on individuals engaged in fitness every day: a course intake of fitness bars for 30 days in an amount of 50 g / day after training contributed to an increase in the strength index, speed-strength endurance, and overall physical performance of the subjects. The use of fitness bars in the diet is an additional adaptogenic factor to optimize the effect of training sessions.

Key-words: Energy Bars, Human Health, Food Industry.

1. Introduction

The modern rhythm of life, especially for residents of large cities, creates more and more obstacles to normal nutrition. During a busy day at work, many physically do not have enough time for this. That is why fast food is very popular today. When there is no way to eat normally, in order to somehow "have a snack", at least "on the run", people consume products such as, for example, candy

bars [4,5,8]. Their predecessors were real chocolate products, which were produced by the food industry mainly for children. The undoubted advantages of these products were the use of natural raw materials, high taste characteristics and a striking external design. Their disadvantages include a high carbohydrate content, mainly sucrose, meaning this product had a high glycemic index, which is not beneficial. In the composition of modern confectionery bars, a significant part of fats is no longer in the form of natural cocoa butter, but in the form of its substitutes, and most of the carbohydrates are in the form of glucose-fructose syrups. Acceleration of the socio-economic development of society requires changes in the structure and quality of food, provides for the inclusion in the diet of foods fortified with vitamins and other biologically active substances. Studies have shown that currently the foodstuffs consumed by Russians do not meet the physiological needs of a person, as a result of which alimentary morbidity increases, efficiency decreases, and life expectancy and the population of the Russian Federation are reduced. The domestic and foreign experience accumulated at the present time convincingly indicates that specialized products of various functional orientation play an important role in the correction of nutrition and health, and contribute to the prevention of the above diseases [1-3,6].

In recent years, such a direction in the food industry as the production of functional food products has become widespread. Functional food products are food products intended for systematic consumption in the diet of all age groups of a healthy population, reducing the risk of developing diseases related to nutrition, maintaining and improving health due to the presence of physiologically functional food ingredients in its composition. Physiologically functional food ingredients include biologically active or physiologically valuable ingredients that are safe for health and have precise physicochemical characteristics for which properties have been identified and scientifically proven, and consumption rates have been established in food composition that are beneficial to maintain and improve health [7,12,15]. A fortified food is a functional food that is taught by adding one or more physiologically functional food ingredients to traditional foods to prevent or correct nutritional deficiencies in the human body. All food products are divided into 2 groups according to their purpose: products for general and specialized purposes. The latter can have different functional directions. Specialty products include dietary, therapeutic and prophylactic, dietary supplements and foods for specific populations. In addition, specialized products can be classified similarly to the general purpose products that serve as the basis for their creation, according to the following classification criteria: basic raw materials, production technology, biological origin, etc.

2. MATERIALS AND METHODS

During clinical trials of the developed product, the data obtained during the examination and observation of 30 people with low power loads were used. The product was received in 1-2 pieces within 30 days before bedtime. Differences between comparison parameters were considered statistically different at $p < 0.05$. The study was conducted in accordance with the principles of the Declaration of Helsinki of the World Medical Association (as amended in 2000 with explanations given at the General Assembly of the WMA in Tokyo, 2004), with the rules of good clinical practice of the International Conference on Harmonization (ICHGCP), ethical principles set forth in the European Union directive 2001/20 / EC, and the requirements of national Russian legislation. Each patient signed an Informed Consent to participate in the trial. The average age of the people was (38.5 ± 8.3) years. All patients were offered the Nottingham Quality of Life Questionnaire.

3. RESULTS AND DISCUSSION

Of particular importance to athletes are the problems of ensuring regular nutrition. Unlike people who usually lead a sedentary lifestyle, the body of athletes is characterized by increased energy consumption and therefore anticipates special requirements for the amount and stability of energy consumption in the form of food. When energy is deficient, athletes can experience adverse changes associated, in particular, with the loss of muscle mass due to its use as one of the sources of energy. An example of this kind is the gluconeogenesis process. At the same time, in order to cover the lack of glucose that occurs in the blood, which is essential for the nutrition of the brain, amino acids can be used from the breakdown of muscle tissue proteins. The result will be a loss of muscle mass by the athlete, which will negatively affect his strength and overall physical potential. Fasting for athletes, even partial fasting, can be harmful. If necessary, for example to reduce body weight before a competition, it should be carried out under strictly controlled conditions using a specially designed regimen and a low-calorie diet. When long breaks occur in food intake, as well as for use as a pre-workout, post-workout nutrition and additional energy supply, athletes and many ordinary people in their daily lives use foods that are similar in form of release and partially in their functions to traditional chocolate bars. ... However, in order to adapt these products to the needs of athletes and healthy lifestyle enthusiasts, their composition and functional characteristics have undergone significant changes. They also received a new collective name - "sports bars". The first in this series, apparently, was the American product "Space food sticks", released in the wake of the popularity of

the space theme in the late 60s of the XX century. Later, after the launch of this kind of products by the American company Power Bar, sports bars gained wide popularity among athletes, fitness enthusiasts and young people [9,10,11].

Currently, they have a certain functional specialization, conditionally they can be divided into three main groups. Energy sports bars. Their main purpose is to provide the human body with a source of additional energy, especially in those situations where significant physical and mental endurance is required. Developers of high quality products of this type, their composition is designed in such a way that the supply of the human body with the necessary energy occurs continuously over a sufficiently long period of time. To do this, as the main component, they include a complex of carbohydrates that differ in different values in the glycemic index, that is, they have different indicators of absorption in the body and the flow of glucose into the blood. A significant proportion of energy sports bars are high glycemic carbohydrates, which quickly raise blood sugar levels. Such properties are possessed by glucose, fructose, sucrose, maltodextrin, honey, glucose-fructose syrups and starch syrup with a high degree of saccharification. Maltodextrin, which is a product of the partial enzyme breakdown of starch, is considered a promising ingredient in energy sports bars. On the one hand, it belongs to the group of rather “fast” carbohydrates, but at the same time does not have a pronounced sweet taste inherent in them, which has recently sometimes irritated consumers of sports nutrition [13, 14].

Carbohydrates that provide a long-term energy supply to the body can include foods such as puffed rice, puffed corn, puffed wheat, cereal flakes, and other starch-rich components. Energy sports bars can also contain raisins, dried fruit and nut pieces, lemon and orange peel. However, the proportion of these components in the energy types of sports bars is limited and usually does not exceed a few percent. This is because the low fiber content of the product should not irritate the stomach and create additional stress on the digestive system during intense exercise, as well as promote frequent bowel movements, which can be difficult, for example, in competitive conditions. To further increase the specific calorie content of energy bars, that is, the energy obtained from their consumption per unit of mass, a certain amount of fat components can be included in their composition [16,17, 18]. For athletes, ideally, these should be fats with increased nutritional value, containing such valuable representatives as, for example, cocoa butter or triglycerides of polyunsaturated fatty acids obtained from marine fish that live in natural conditions. However, for reasons of economy, most manufacturers prefer the cheaper varieties of vegetable fats, with the exception of hydrogenated fats. As one of the stimulants, while simultaneously easing muscle pain,

sports physiologists are actively promoting the principle - "no pain - no benefit", that is, "no pain - no result." For this, caffeine is included in selected energy bars. In terms of its effect, it can be noted that taking caffeine in a sports energy bar is comparable to drinking a good cup of coffee. Unlike conventional chocolate bars, scientifically based energy sports bars, when used correctly, can provide a regular supply of energy to the body, but at the same time do not create conditions for gaining excess body weight [19].

The bars can be used by athletes as a means of recharging the body with energy 2-3 hours before intense training, taken directly during physical exercise, and also consumed after training as one of the possible options after training (restorative) nutrition. Energy bars, like other sports bars, provide a viscous chewy texture. This not only creates a specific flavor profile, but also prevents crumb formation during biting and subsequent chewing. When exercising or working, vigorous breathing can cause crumbs to enter the airways and cause a violent cough. It should be emphasized right away that energy is not a good idea to be taken as food throughout the day, especially as a regular food source. They, if necessary, can only fulfill the role of a useful and at the same time pleasant addition to it. It is most rational to consider energy bars precisely as an element of sports nutrition, and use them when they are really needed, that is, during periods of high physical activity. If addicted to them, the high calorie content of energy bars can lead to weight gain and signs of obesity. In addition, using them instead of traditional food products will also entail additional material costs. In recent years, in addition to energy producers, manufacturers have developed so-called high protein bars (i.e. high protein bars). As you know, proteins are the most scarce and valuable component in the human diet. The main task of high protein sports bars is to supply the human body with building materials for the restoration of muscle tissues, which are actively damaged during intense physical exertion, as well as triggering the processes of anabolism (muscle growth). Therefore, high protein sports bars are of particular interest to bodybuilders, weightlifters, people who are actively involved in fitness, etc. They contain a variety of different types of proteins with varying absorption times. They may contain, for example, whey protein, which is rapidly absorbed by the body, along with milk casein, which has a much slower digestion rate. As part of high-protein bars, concentrates or isolates can be used, that is, more refined forms of many proteins of animal and plant origin - whey, milk, eggs, soy, etc. Protein hydrolysates are particularly effective, albeit more expensive, components of high protein bars. They contain a significant amount of fragments of protein molecules and individual amino acids, which allows them to be absorbed by the body especially quickly. For example, collagen hydrolyzate can be present in high protein bars, which are

intended to improve the condition and prevent diseases of the joints and ligaments of athletes. Certain individual amino acids, especially leucine, isoleucine and valine, which are in the branched chain amino acid group, hold promise for inclusion in high protein bars. They are most effective in stimulating muscle growth in the body of athletes. An example of such a product is the Idealbar sports bar, developed by GEON, a leading domestic sports nutrition manufacturer. Contains proteins of various origins - milk protein concentrate, collagen hydrolyzate, soy protein isolate and chicken egg protein. The total protein content of the bar is over 20%. In terms of the content of essential amino acids, the composition of the protein fraction of the bar is close to ideal, which is currently recommended by nutritionists.

We have developed a recipe composition for the production of fitness bars for feeding people with low power loads. The synergistic interaction of the functional ingredients in the composition accelerates the recovery of physical strength during and after fitness sessions. The initial empirical selection of the optimal ratio of components in the composition of fitness bars is confirmed by the results of industrial applicability of the invention. Based on the materials obtained, the following conclusions were drawn: 1. Reception of the bar has a beneficial effect on the clinical manifestations of diseases. The ergogenic properties of the developed food product were determined experimentally by the following parameters: power index, speed-power endurance, general physical performance. Control tests were conducted on daily fitness individuals. The research results indicate that the course intake of fitness bars for 30 days in the amount of 50g / day after training contributes to an increase in these parameters (table 1).

Table 1. Indicators of the quality of life of respondents after taking the bar

Index	Prototype example	Prototype
Power index,%	3,3	3,9
Strength endurance,%	4,2	5,2
General physical performance,%	8,1	10,2

The sensory evaluation showed that the fitness bars have a uniform consistency with a stable structure, a spicy taste with a cool effect, a dark brown color and an original spicy-woody smell. The use of fitness bars in food is an additional adaptogenic factor to optimize the effect of training sessions.

4. CONCLUSIONS

The studies carried out show the advisability of using the bar for feeding people with low power loads. The obtained data give grounds to recommend the product as an additional diet therapy to increase the body's resistance to adverse environmental influences, stressful situations, psycho-emotional and physical stress.

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