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Examination of Nutritional Information of Athletes in Different Olympic Branches

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Abstract

Nutrition is one of the most important factors for a healthy life, growth, development, appropriate body weight, defense against diseases, and sportive performance. The person's age, gender, daily physical activity status, and before, after, and during training and competitions should be fed appropriately. Since the performance in athletes takes place by expending physical effort, the supply of necessary energy plays a key role in performance. Purpose: This study aims to examine athletes' nutritional information in different Olympic sports branches. 313 athletes with an average age of 22.53 years, a body weight of 68.87 kg, a height of 174.44

cm, and an average sports age of 8 years, active in different Olympic sports branches, participated in the study. In the study, the data, the "Athlete Nutrition Knowledge Scale" was used. The arithmetic mean and standard deviations, descriptive properties, and percentage distribution frequencies of the obtained data were determined, and the SPSS 20 package program was used for all statistical analyses. Important findings were obtained within the scope of the study; Protein is the main source of energy used by muscles during exercise in 54.8% of athletes. When 50.2% of people want muscle gain, the basic dietary change required is to increase the amount of protein in the diet. 48.4% of vegetarian athletes can meet their protein requirements without using protein supplements. 45.8% Fruits and Vegetables are the best sources of calcium. Milk, Yogurt, and Cheese with 49.2% are the best sources of magnesium. 57.2% of Athletes A physically fit person with an adequate diet can improve his performance by consuming more vitamins and minerals. 66.2% of athletes should take vitamin C as a routine supplement by athletes. 50% of athletes test the purity and safety of all supplements before the sale. As a result of the study, when the above findings were examined, it was concluded that the knowledge of the athletes interested in the Olympic branches is not at the desired level and that they have partially wrong nutrition information. It is thought that it is necessary to increase nutritional knowledge.

Keywords: Sports, Olympic athlete, Sports nutrition

1. Introduction

1.1 Introduce the Problem

Nutrition is among the most important factors affecting athletic success. The nutrients (appropriate food and liquid consumption) consumed by the athletes before, during, and after the competition and training will affect their performance positively and accelerate the recovery process (Ersoy, 2004). In addition, it is to take and consume the energy and nutrients needed for growth, development, and healthy life at an adequate level (Tanır et al., 2001).

Sports nutrition, providing energy for physical activity, performing the body repair and recovery process, and optimizing performance in sports competitions; is defined as the application of nutritional information to a practical daily diet plan to provide a healthy and good appearance (Sedek & Tan, 2014).

The main purpose of sports nutrition; is the provision of adequate and balanced nutrition according to the athlete's age, gender, sports branch, load level, position in the game, training duration and intensity, and the energy expended (Özdemir, 2010; Ersoy, 2016; Bezci et al., 2018; Insel., 2014).

The ability of athletes to increase their performance in training and competitions to optimal levels is undoubtedly closely related to their nutrition. A carefully planned nutrition program has significant positive effects on athletic performance (Rodriguez, Di Marco, & Langley, 2009; Potgieter, 2013; Broad, & Cox, 2008). Sports nutrition is an issue that athletes and coaches still do not give enough importance to (Güneş, 2005). It is known that athletes do not have sufficient knowledge of proper nutrition, and they experience losses in performance due to faulty and incorrect nutrition practices (Yarar et al., 2011; Süel et al., 2006; Yarar,

Gökdemir, & Özdemir, 2011).

While scientific studies have understood that most athletes have sufficient nutritional knowledge and that proper nutrition through optimum nutrition is an indispensable part of a training program; It is known that many athletes and even coaches still do not have enough knowledge about healthy nutrition practices and are unconscious about sports nutrition (Grete et al., 2011; Eskici, Yarar, & Koc, 2016). In addition, research shows that many athletes have inadequate dietary intakes, which may result from a lack of time, finances, cooking skills, and access to cooking equipment when trying to choose and prepare appropriate meals and snacks (Araz & Hosseini, 2012).

In a systematic review of the nutritional information of recreational and elite athletes in 2011, scores in various nutritional information questionnaires evaluating general and sport-specific nutrition were found to be mediocre, with average scores ranging from about 45-65% (Heaney et al., 2011).

In recent years, the importance of nutrition in the success of athletes has begun to be increasingly understood, and the products for athletes and mostly non-scientific information in the media have led athletes and trainers to ask more questions (Güneş, 2005).

This study, it is aimed to examine the nutrition information competing in the Olympic sports branches, and to inform the athletes, trainers, and administrators competing in the relevant sports branches within the framework of the information obtained.

2. Method

2.1 Research Model

In this study, which was conducted to examine the nutritional information of the athletes in different Olympic sports branches, the instant scanning approach and the relational scanning model, which are included in the general scanning model, were preferred. It is aimed to describe the situation as it is within the period determined by the instant scanning approach (Karasar, 2002).

2.2 Research Group

Badminton (n = 4), Basketball (n = 13), Cycling (n = 4), Boxing (n = 31), Football (n = 85), Wrestling (n = 14), Weightlifting (n = 19), Handball (n = 18), Gymnastics (n = 2), Judo (n = 3), Karate (n = 15), Skiing (n = 2), Table tennis (n = 2), Archery (n = 3), Taekwondo (n = 7), Track and field (n = 18), Tennis (n = 14), Volleyball (n = 24), Swimming (n = 35) randomly selected from 19 different Olympic branches, mean age 22.53 years, body weight A total of 313 athletes (230 men and 83 women) with a weight of 68.87 kg, a height of 174.44 cm and an average sports age of 8.0 years participated.

2.3 Data Collection

The scale form created for the collection of data was collected via the internet and delivered to the participants via various social media tools. The study, “The Nutrition for Sport Knowledge Questionnaire” (NSKQ) was developed by Trakman et al. (2017), and the scale

was translated into Turkish by Çırak and Çakıroğlu, (2019) after a validity and reliability study. The scale consists of a total of 89 statements; It includes 6 sub-dimensions: Weight Control (13 items), Macro Nutrients (30 items), Micro Nutrients (13 items), Sports Nutrition (13 items), Supplements (12 items), and Alcohol (8 items). The items on the scale are multiple-choice and 3-point Likert types (agree-disagree-not sure; effective-not effective-not sure).

2.4 Data Analysis

In the study, Arithmetic means, the percentage frequency values of other data to determine the demographic characteristics of the participants (age, height, weight, sports age) calculated. SPSS 20.0 (Statistical Package for the Social Sciences) software was used for all statistical analyses.

2.5 Research Publication Ethics

The suitability of this study was approved by Bolu Abant İzzet Baysal University Clinical Research Ethics Committee (Date: 22.12.2020, Decision No: 2020/306).

3. Results

The answers and percentages of the participants to the questions consisting of 6 sub-dimensions: weight control, macronutrients, micronutrients, sports nutrition, supplements, and alcohol are shown in Table 1.

Table 1. Percentage distribution of participants' nutritional information and responses (n% = 313)

Questions		I agree (%)	I don't agree (%)	I am not sure (%)
Weight Control	In endurance sports, being at the lowest possible weight is beneficial for performance in the long run.	46.0	33.9	20,1
	When only muscle gain is desired, the basic dietary change required is to increase the amount of protein in the diet.	50.3	30.9	18.8
	Fat is required by the body to make cell membranes and molecules related to immune function.	59.2	14.1	26.8
	Athletes should not consume more than 20 grams of fat per day.	44.2	31.2	21.7
	As exercise intensity increases, the percentage (%) of fat burned for energy also increases.	74.1	12.6	13.3
	When doing low-intensity exercise, fat meets all of your energy needs.	37.1	45.6	17.3
Macro Nutrients	Protein is the main source of energy used by muscles during exercise.	54.9	35.3	9.8
	Vegetarian athletes can meet their protein requirements without using protein supplements.	48.5	33.6	17.9
	Protein absorption at a single time is limited.	43.8	20.8	35.4
	A balanced diet that provides sufficient energy meets all protein needs.	54.6	18.8	26.6

Micro Nutrients	Calcium is the largest structural component of bone crystals.	76	7	17
	Vitamin C acts as an antioxidant in the body.	69.2	7.1	23.7
	Thiamine (Vitamin B1) is necessary for the effective delivery of oxygen to the muscles.	40.8	11.9	47.3
	Iron's main role is to convert food into usable energy.	47.4	19.8	32.8
	Meat, Chicken, and Fish are the best sources of zinc	70.1	12.6	17.3
	Whole grain foods are the best sources of vitamin C.	25.2	51.3	23.5
	Fruits and Vegetables are the best sources of calcium	45.9	37.8	16.2
	Milk, Yogurt, and Cheese are the best sources of magnesium.	49.3	28.9	21.8
	Athletes' need for magnesium increases due to sweat loss.	53.2	12.8	34.4
	Menstruating women need more iron than men.	54.9	11.9	33.2
	The ideal calcium intake for athletes between the ages of 15 and 24 is 500 mg.	36.2	13.7	50.2
	A physically fit person with a nutritionally adequate diet can improve performance by consuming more vitamins and minerals.	57.4	25.1	17.5
Sports Nutrition	Consuming carbohydrates during exercise can reduce strength and muscle gain.	37.9	34.5	27.6
	In activities lasting 60-90 minutes, 30-60 g of carbohydrates should be consumed per hour.	25.8	25.2	49.0
	Consuming carbohydrates during exercise will help in maintaining blood glucose levels.	43.8	20.9	35.3
Supplements	Vitamin C should be taken as a routine supplement by athletes.	66.3	13.3	20.4
	B vitamins should be taken when feeling tired.	31.6	32.6	35.8
	Salt tablets should be used by athletes who experience cramps during exercise.	34.6	20.1	45.3
	Iron tablets should be taken when the athlete feels extremely tired and pale.	46.7	16.6	36.7
	All supplements are tested for purity and safety before the sale.	49.8	19.4	30.8
	Supplement labels may contain false or misleading information.	50.9	19	30.1
	Creatine reduces post-exercise fatigue by acting on the central nervous system.	49.8	11.3	38.8
	Caffeine increases the efficiency of the muscles at the rate of oxygen delivery.	51.4	20.3	28.3
	Beet Juice (nitrate) reduces muscle breakdown and muscle soreness.	44.5	10.7	44.8
	During high-intensity activity, Beta-Alanine produces carnosine, a protein that can buffer ("absorb") the byproducts of acid produced.	22.0	9.3	68.7
Alcohol	When consumed as part of the diet, pure alcohol (ethanol) contains calories and can therefore lead to weight gain.	48.1	14.4	37.5
	If a person does not drink at all during the week, they can have five or more drinks on the weekend.	11.1	62.6	26.3
	Large amounts of alcohol after injury can slow healing.	65.7	9.0	25.3
	Alcohol has been shown to increase urinary losses during recovery after exercise.	47.2	12.4	40.3

The participants answered the question "Being at the lowest possible weight in endurance sports is beneficial for long-term performance" with the answer 46.0% agree, 33.9% disagree, and 20.1% not sure. 50.3% agreed, 30.9% disagreed, and 18.8% said I am not sure about the question "The basic dietary change required when only muscle gain is desired is to increase the amount of protein in the diet". "Fat is required by the body to make cell membranes and molecules related to immune function; 59.2% agreed, 14.1% disagreed, 26.8% said I am not sure. To the question "Athletes should not consume more than 20 grams of fat per day", 44.2% agreed, 31.2% disagreed, and 21.7% said I am not sure. 74.1% agreed, 12.6% disagreed, and 13.3% said I am not sure to the question "When the exercise intensity increases, the percentage (%) of fat burned for energy also increases". 37.1% agreed, 45.6% disagreed, and 17.3% said I am not sure for the question "Fat meets all energy needs while doing low-intensity exercise" (Table 1).

Participants answered the question "Protein is the main source of energy used by muscles during exercise"; 54.9% agree, 35.3% disagree, and 9.8% are not sure. To the question "Vegetarian athletes can meet their protein requirements without using protein supplements"; 48.5% agreed, 33.6% disagreed, and 17.9% answered not sure. To the question "The protein absorption is limited at one time"; 43.8% agreed, 20.8% disagreed, and 35.4% said I am not sure. To the question "A balanced diet that provides sufficient energy meets all protein needs"; 54.6% agreed, 18.8% disagreed, and 26.6% answered not sure (Table 1).

To the question "Calcium is the largest structural component of bone crystals"; 76% agreed, 7% disagreed, and 17% were not sure. "Vitamin C acts as an antioxidant in the body; 69.2% agreed, 7.1% disagreed, 23.7% answered not sure. For the question "Thiamine (Vitamin B1) is necessary for the effective delivery of oxygen to the muscles", 40.8% agreed, 11.9% disagreed and 47.3% said I am not sure. To the question "The main role of iron is to convert food into usable energy", 47.4% agreed, 19.8% disagreed, and 32.8% said I am not sure (Table 1).

Participants answered the question "Meat, Chicken and Fish are the best sources of zinc"; 70.1% agreed, 12.6% disagreed, and 17.3% said not sure. To the question "Whole grain foods are the best sources of vitamin C", 25.2% agreed, 51.3% disagreed, and 23.5% answered not sure. To the question "Fruits and Vegetables are the best sources of calcium"; 45.9% agree, 37.8% disagree, and 16.2% are not sure. To the question "Milk, Yogurt and Cheese are the best sources of magnesium"; 49.3% agreed, 28.9% disagreed, and 21.8% said I am not sure (Table 1).

Participants answered the question "Magnesium requirement increases due to sweat loss of athletes"; 53.2% agree, 12.8% disagree, and 34.4% are not sure. To the question "Women during menstruation need more iron than men"; 54.9% agree, 11.9% disagree, and 33.2% are not sure. To the question "The ideal calcium intake for athletes between the ages of 15 and 24 is 500 mg"; 36.2% agree, 13.7% disagree, and 50.2% are not sure. To the question "A person who is physically fit and has a nutritionally adequate diet can improve his performance by consuming more vitamins and minerals"; 57.4% agreed, 25.1% disagreed, and 17.5% said I am not sure (Table 1).

Participants answered the question "Consuming carbohydrates during exercise can reduce strength and muscle gain" 37.9% agree, 34.5% disagree and 27.6% are not sure. 30-60 g carbohydrate should be consumed per hour in activities that last 60-90 minutes; 25.8% agreed, 25.2% disagreed, and 49.0% said I am not sure. 43.8% agreed, 20.9% disagreed, and 35.3% said I am not sure about the question "Consuming carbohydrates during exercise will help in maintaining blood glucose levels" (Table 1).

Participants were asked "Vitamin C should be taken as a routine supplement by athletes"; 66.3% agreed, 13.3% disagreed, and 20.4% I am not sure. "B vitamins should be taken when feeling tired; 31.6% agreed, 32.6% disagreed, 35.8% said not sure. To the question "Salt tablets should be used by athletes who have cramps during exercise"; 34.6% agreed, 20.1% disagreed, and 45.3% answered not sure. "Iron tablets should be taken when the athlete feels extremely tired and pale; 46.7% agreed, 16.6% disagreed, 36.7% answered not sure. To the question "All supplements are tested for purity and safety before sale"; 49.8% agree, 19.4% disagree, and 30.8% are not sure. "Reinforcement labels may contain false or misleading information" 50.9% agreed, 19% disagreed, and 30.1% were not sure (Table 1).

To the question "Creatine reduces post-exercise fatigue by acting on the central nervous system"; 49.8% agreed, 11.3% disagreed, and 38.8% were not sure. To the question "Caffeine increases the efficiency of the muscles in the oxygen delivery rate"; 51.4% agreed, 20.3% disagreed, and 28.3% said not sure. For the question "Beet Juice (nitrate) reduces muscle breakdown and muscle pain", 44.5% agreed, 10.7% disagreed, and 44.8% said I am not sure. To the question "Beta-Alanine produces carnosine, a protein that can buffer ("absorb") the byproducts of acid produced during high-intensity activity"; 22.0% agreed, 9.3% disagreed, and 68.7% said I am not sure (Table 1).

The participants answered the question "When consumed as a part of the diet, pure alcohol (ethanol) contains calories and therefore can lead to weight gain", 48.1% agree, 14.4% disagree, and 37.5% are not sure. To the question "If a person does not drink at all during the week, he can have five or more drinks on the weekend"; 11.1% agreed, 62.6% disagreed, and 26.3% answered not sure. To the question "Large amount of alcohol can slow down recovery after injury"; 65.7% agreed, 9.0% disagreed, and 25.3% said not sure. To the question "Alcohol has been shown to increase urinary losses during recovery after exercise"; 47.2% agreed, 12.4% disagreed, and 40.3% said I am not sure (Table 1).

4. Discussion

The important findings obtained within the scope of the study;

- 50.3% when only muscle gain is desired, the basic dietary change required is to increase the amount of protein in the diet.
- 59.2% said Fat is required by the body to make cell membranes and molecules related to immune function.
- 74.1% said that when the intensity of exercise increases, the percentage (%) of fat burned for energy also increases.

- 54.9% Protein is the main source of energy used by muscles during exercise.
- 66.3% of vitamin C should be taken as a routine supplement by athletes.
- A person, 57.4% of whom are physically fit and have a nutritionally adequate diet, can improve their performance by consuming more vitamins and minerals.
- 45.9% Fruits and Vegetables are the best sources of calcium.
- 49.8% of all supplements are tested for purity and safety before the sale.
- 68.7% of Beta-Alanine produces carnosine, a protein that can buffer ("absorb") the by-products of the acid produced during high-intensity activity".

50.3% of the athletes said, "The main dietary change required when only muscle gain is desired is to increase the amount of protein in the diet." Especially strength athletes believe that extra protein intake will increase their success and they prefer to consume more protein than they need. Consuming protein more than necessary brings with it some negativities; Inadequate consumption of other nutrients, increase in oxidation, loss of calcium in the urine, increase in the risk of stone formation in the kidneys, overload of the kidney, and liver, and cause gout in the joints. Excessive protein consumption for muscle development and strength is not recommended in terms of health (Eskici, 2020).

"Fat is required by the body to make cell membranes and molecules related to immune function," 59.2% said. The results of the studies carried out; recommend the use of supplements such as vitamins, minerals, probiotics, and omega-3s to strengthen immunity in many treatments and/or prevention of diseases (Çetin, 2020; Coşkun, 2005, Çakmakçı & Kahyaoğlu, 2012; Sánchez et al., 2017).

In the study, it was found that gender did not have any effect on the level of knowledge of liquid substances seen. Again, the level of knowledge of nutrients and weight control in terms of gender. When examined, it was seen that there was no significant difference between the male and female genders. However, there is a difference between income status, recovery knowledge level and weight control knowledge level. It was found that there was a significant difference, and the level of income status, recovery and weight control knowledge levels appears to have a positive effect on (Gümüşdağ & Kartal, 2017).

It is known that consuming some natural nutrients, especially to strengthen the immune system, will give the person resistance. For example, drinking plenty of water, consuming unprocessed food, consuming especially raw vegetables and fruits, giving priority to the consumption of foods containing chlorophyll (such as lettuce, chard, spinach, parsley), consuming foods containing carotene (especially orange-colored vegetables and fruits), consuming apples and coriander (for removing heavy metals), consuming foods containing beta-glucan (foods with high fiber content), eating foods rich in iron and consuming eggs strengthen the immune system (Çetin, 2020; Müftüoğlu, 2003; Sezgin, 2014).

74.1% said, "As exercise intensity increases, the percentage (%) of fat burned for energy also increases." The main differences between sports branches are due to the energy systems used

and the contribution of the required nutrients to the total energy (Özdemir, 2010). Carbohydrates (CHO) are very important for endurance athletes (Roy, 1998). Fat is the body's primary fuel at rest and during low-to-moderate exercise. As the intensity of exercise increases, the activity of carbohydrate stores will increase. Because they are fast energy sources for our body.

54.9% "Protein is the main source of energy used by muscles during exercise". Carbohydrates are the body's only fuel, especially during vigorous exercise. We use carbohydrates and fats as the main energy source. If the body finds CHO, it acts as a protein protector, as there is no need to create CHO from proteins. If the other fuels (carbohydrate and fat) the body uses to meet its energy needs are insufficient (Benardot, 2012), the protein stored in the muscles begins to break down to produce CHO. The process of obtaining CHO from a non-carbohydrate molecule occurs through gluconeogenesis (protein or lactic acid).

66.3% of them answered, "Vitamin C should be taken as a routine supplement by athletes". Individuals who play sports should make sure that they have a sufficient and balanced diet before considering taking a vitamin C supplement. The recommended amount of vitamin C (60 mg/day) to be consumed daily should be obtained primarily from food. The addition of vitamin C does not cause an increase in endurance and strength performance, but studies are showing that supplementation of vitamin C reduces oxidative stress, thus muscle damage and muscle pain (Atabek, & Özdemir, 2010). Even if the training is increased, supplementation does not increase performance when vitamin C is not deficient (Gürsoy, & Dane, 2002).

57.4% said, "A person who is physically fit and has a nutritionally adequate diet can improve his or her performance by consuming more vitamins and minerals." In the case of adequate and balanced nutrition, the use of additional vitamins and minerals is not recommended. However; in cases such as energy restriction, allergy, lactose intolerance, pregnancy and vegetarianism, bad eating habits, skipping meals, insufficient sleep, and frequent fast-food consumption, it is necessary to use additional vitamins in the diet with the help of specialists. However, the basic condition of a healthy diet is to consume an adequate and balanced diet in terms of energy and nutrients (Ersoy, 2004; Ersoy, 2010) unlike vitamins, additional mineral intake by athletes is probably higher (Gürsoy, & Dane, 2002). When iron-deficient athletes were given additional iron, performance values, especially aerobic capacities, were improved. However, it has been observed that there is no benefit to giving iron addition to those without iron deficiency (Gürsoy, & Dane, 2002). The side effects that may occur in the case of taking nutritional supplements without a prescription and in high doses are as follows: Antioxidant vitamins such as E and C can reduce the effectiveness of chemotherapy types. Vitamin A can cause headaches and liver damage, and reduce bone strength (Ertaş, 2022). Iron supplementation can cause nausea and vomiting, and damage the liver and other organs (Yetley, 2007). It is important to consult a physician because omega3 fatty acids, vitamins E and C, herbal products, and some nutritional supplements may affect blood coagulation and should not be used 10-14 days before the surgical intervention or serious medical tests (Mahan, & Raymand, 2021).

45.9% said, "Fruits and Vegetables are the best sources of calcium". Calcium sources are

milk and its products, sesame, peanut, hazelnut, and green leafy vegetables (Gökçen, Aksoy, & Özcan, 2019). The richest and most natural sources of calcium are milk and yogurt. In addition, cabbage, broccoli, spinach, tofu, and various grains are also calcium-rich foods.

Consuming carbohydrates during exercise may decrease strength and muscle gain". A homogeneous distribution was observed in the responses. The first target during the exercise; is a nutritional model that contains carbohydrates (30-60 g/hour) to ensure blood glucose continuity, helping to meet fluid loss. 200-250 ml of beverage containing 6-8% CHO should be consumed every 10-15 minutes. Adding protein to the beverage (CHO/PRO = 3-4/1) improves endurance performance and increases glycogen resynthesis (Özdemir, 2010; Am College of Sports Med, 2009; Ersoy, 2004). In many studies, it has been determined that carbohydrate drinks with added protein both increase endurance and delay the time of fatigue (Valentine et al., 2008).

49.8% said, "All supplements are tested for purity and safety before sale". Today, the number and variety of nutritional supplements and medicines are many, and although the general idea is that these products are natural and reliable, this general idea can sometimes be wrong. Because these drugs, which are thought to be very beneficial, may have many side effects of their own (Corrigan, 2000). Ersoy, & Hasbay (2006) stated that some of the various auxiliary products contain stimulants and items on the doping list that they should be used at the right time, in the right amount, and that help from professional experts should be sought, otherwise, it will adversely affect the health of the athletes. Natural and healthy nutrition is very important in terms of performance and health. Experts recommend limiting the consumption of processed foods containing additives and staying away (Yaman, & Çelik, 2008).

68.7% said "Beta-Alanine produces carnosine, a protein that can buffer ("absorb") the byproducts of acid produced during high-intensity activity," said I'm not sure. Beta-alanine is a non-essential amino acid produced endogenously and obtained in small amounts from animal foods. Consumed as a supplement, beta-alanine increases muscle carnosine levels, thereby acting as an intracellular pH buffering agent. Increased buffering capacity is beneficial in increasing high-intensity exercise tolerance (https://berkayturkkan.com; Trexler et al., 2015).

Research has shown that a significant proportion of athletes do not have sufficient knowledge of athlete nutrition, and some are erroneous found to have eating habits, family and coaches active in the training of athletes they were determined to be (Gümüşdağ et al., 2020).

5. Conclusion

As a result, it has been concluded that the knowledge of the athletes interested in different Olympic branches is not sufficient and they have partially wrong nutrition information. Considering the importance of nutrition in terms of both sportive performance and health, it is necessary to increase the nutritional knowledge of the athletes by experts.

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