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Nutritional knowledge and status of Montenegrin athletes: focus on general and sports nutrition

Snezana Barjaktarovic-Labovic[1], Snezana Pantovic[2], Ivana Joksimovic[1], Ines Banjri[3]

[1]Institute of Public Health of Montenegro, Podgorica, Montenegro

[2]Faculty of Medicine, University of Montenegro, Podgorica, Montenegro

[3]Faculty of Food Technology, Josip Juraj Strossmayer University, Osijek, Croatia

Corresponding author:
Snezana Barjaktarovic-Labovic
Institute of Public Health of Montenegro,
Popovici 85, Podgorica, Montenegro,
E-mail address: snezanab.labovic@ijzcg.me

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Abstract

The assessment of athletes' nutritional status is a crucial aspect of enhancing sports performance, maintaining health, and reducing the risk of injuries. Nutritional status provides a comprehensive insight into athletes' dietary habits and needs, enabling tailored adjustments in energy and nutrient intake according to the specifics of individual sports, training intensity, and personal goals. The focus is often placed solely on the athletic component of training, while the nutritional factor is unjustly neglected. The aim of this study was to examine athletes' knowledge of proper nutrition and supplementation. A secondary objective was to assess the nutritional status of the studied group of athletes based on anthropometric parameters. A cross-sectional study was conducted in five towns in Montenegro (Podgorica, Bar, Berane, Budva, and Bijelo Polje) in 2022. The BMI calculated from anthropometric measurements (Mean 22.58±2.92) was within the normal range for 83.1% of the participants, 12.1% were overweight, and 4.8% were underweight. More than a third of participants (38.8%) reported using dietary supplements, with the majority (33.0%) taking supplements on their own initiative, while 17.0% followed medical advice. The percentage of correct answers ranged from 16.7% to 84.8%, with an overall mean of 1.53±0.15. A statistically significant influence of gender, education level, competition rank, and sources of nutrition information on participants' nutrition knowledge was found. No correlation was observed between BMI and overall nutrition knowledge, nor between overall knowledge and body fat presence. The results of the study suggest that integrated approaches to nutrition, based on precise assessments of nutritional status and education, significantly contribute to improved sports performance and athletes' health, and should be considered as a standard in sports practice.

Nutrition education and support from certified dietitians in sports clubs could play a crucial role in achieving this goal. With a better understanding of nutrition, athletes can make informed food choices and optimize their performance, ultimately contributing to their overall health and success in sports.

***Keywords**: nutritional status; sports performance; athlete education; proper nutrition; supplementation.*

INTRODUCTION

Balanced nutrition is one of the most critical aspects of both training and an athlete's success in sports competitions. Often, the focus is solely on the athletic component of training, while the nutritional factor is unjustly neglected.

"Balanced nutrition is a crucial factor in achieving top results in sports. Proper nutrition alone does not guarantee success in sports, but incorrect nutrition can certainly harm an athlete's training program and limit their maximum performance during competitions. Nevertheless, many athletes have poor dietary habits. Therefore, it is necessary to establish a program for evaluating nutrition to monitor the athlete's diet and ensure adequate education and correction" [1].

Recognizing athletes as unique individuals with specific body composition, metabolic rates, and energy requirements, recent advancements in nutrigenomics reveal a complex relationship between genetics and responses to nutrients [2].

Energy expenditure varies from individual to individual, requiring a personalized nutrition plan tailored

to each person, depending on the type of sport, position within the team, gender, age, and other specific characteristics of the athlete.

Without adequate energy intake, wise food selection, and appropriate timing and consistency of nutrient intake, dietary intake can be insufficient to maintain health and performance. Energy needs depend on gender as well as physical activity. Daily energy requirements for men are generally higher than those for women due to differences in body composition. Men have a higher proportion of muscle tissue compared to fat tissue, while women have a higher percentage of fat tissue. Since muscle tissue is metabolically active, men require more energy, or more food, than women.

Tarnopolsky highlights that he and others have shown that women oxidize more lipids and and less carbohydrates compared to men during endurance exercise. The oxidation of amino acids is also lower in women compared to men during exercise. These gender differences are partly due to higher estrogen levels in women. Specific areas where gender differences are evident in dietary recommendations and supplements include carbohydrate (CHO) intake, protein needs, and creatine monohydrate (CRM) supplementation. Elite and high-performance athletes often require more protein in their diet compared to sedentary individuals [3].

Due to insufficient protein intake, large exertions, and physiological blood loss during the menstrual cycle, female athletes are more prone to developing iron-deficiency anaemia. Meanwhile, vegetarian athletes are at an increased risk of hypocalcaemia, vitamin deficiency, and reduced levels of iron and zinc due to the specificity of their diets. Both men and women can react differently to training and dietary interventions, in terms of body mass and composition.

The American Dietetic Association, the Dietitians of Canada, and the American College of Sports Medicine recommend an appropriate choice of food, fluid, and supplements, as well as optimizing the composition and timing of macronutrients, micronutrients, and fluids throughout the day to ensure adequate energy, glycogen replenishment, maintenance of blood glucose levels, tissue repair, and growth, and ultimately improve athletic performance, recovery from exercises and exercise-induced injuries [4].

Supplements for enhancing training and athletic performance are found in various forms, including tablets, capsules, liquids, powders, or thin patches. Many of these products contain numerous ingredients in different combinations and quantities. Common ingredients include amino acids, proteins, creatine, and caffeine. When choosing supplements, one should be cautious and consult a doctor or nutritionist before use. In most cases, there is no need for supplementation if a diet plan is created to provide the recommended daily intake of nutrients (macronutrients and micronutrients). Exceptions include the absence of certain nutrients in the diet, certain medical conditions (e.g., taking iron for anaemia), pregnancy of female athletes (e.g., taking folic acid), and others.

The goal of this study was to assess athletes' knowledge of proper nutrition and supplementation. A secondary objective was to estimate the nutritional status of athletes from the studied group based on anthropometric parameters, as well as to examine the correlation between knowledge about proper nutrition and nutritional status.

MATERIAL AND METHODS

This cross-sectional study adhered to the principles outlined in the Helsinki Declaration and was approved by the Ministry of Education, Science, Culture, and Sports of Montenegro (Decision number: 05/2-05-056/21-11028/64). The research was conducted in 2022. in five towns across Montenegro: Podgorica, Bar, Berane, Budva, and Bijelo Polje. Written informed consent was obtained from all participants after they were informed about the objectives of the study and the intended use of their data.

Participants and Sampling

The study included 248 participants, all actively engaged in sports disciplines such as basketball, handball, volleyball, karate, and football. The participants were recruited using a stratified sampling method to ensure representation across age, gender, and competition levels. They were aged between 16 and 30 years, with a gender distribution of approximately 70% male and 30% female.

Anthropometric Measurements

Participants underwent anthropometric assessments, including height and weight measurements, using standardized equipment. Body Mass Index (BMI) was calculated as weight in kilograms divided by height in meters squared (kg/m^2). Body composition was analyzed using a bioimpedance scale (TANITA SC 330, Japan), which provided measurements of total body fat percentage and visceral fat content. The scale was calibrated before each measurement session to ensure accuracy.

Questionnaire Design and Validation

A questionnaire was used to assess participants' knowledge of general and sports nutrition. This tool was adapted from the validated project "Understanding Nutrition and Diet Habits of Athletes", originally developed at the Faculty of Kinesiology, University of Zagreb. Modifications were made to tailor the ques-

tionnaire to Montenegrin athletes, and a pilot test was conducted on a small group of athletes (n=20) to evaluate clarity and reliability.

The questionnaire was divided into three sections. The first section collected demographic and anthropometric data, including age, gender, education level, years of sports practice, competition rank, and anthropometric characteristics. The second section focused on knowledge of nutrition and supplementation, with questions assessing participants' understanding of macronutrients, hydration, and the safe use of dietary supplements. Participants were also asked about their sources of nutritional information and personal experiences with supplementation. The third section addressed general dietary recommendations and their application to enhancing sports performance. Responses were recorded using a multiple-choice format with options for "yes", "no", and "don't know". Correct answers were scored as 1, while incorrect and "don't know" responses were scored as 2.

Ethical Considerations

Participants were informed about their right to withdraw at any stage of the study without consequences. Confidentiality of personal data was maintained in accordance with GDPR principles.

Statistical Analysis

Data analysis was performed using SPSS version 26. Descriptive statistics were calculated for all variables. For categorical variables, frequencies and percentages were reported, while mean and standard deviations were calculated for continuous variables. The statistical analysis included various tests to examine the data. Chi-square tests were employed to analyze associations between categorical variables, such as gender and supplement use. Independent samples t-tests and Mann-Whitney U tests were used to compare continuous variables between two groups, such as BMI differences between genders. For comparisons across multiple groups, ANOVA and Kruskal-Wallis tests were applied, for instance, to evaluate competition rank and nutrition knowledge. Pearson correlation coefficients were calculated to assess relationships between continuous variables, such as BMI and nutrition knowledge. The normality of data distribution was assessed using the Shapiro-Wilk test. Statistical significance was determined at a p-value of ≤ 0.05.

RESULTS

The study included 248 participants (100%), representing athletes from five different sports disciplines: basketball, handball, volleyball, karate, and football. Karate practitioners formed the largest group, comprising 28.2% of the sample. Most participants (89.9%) were young athletes aged ≤ 25 years, with a notable predominance of male participants (71.4%). Educationally, 79.8% of participants had completed or were in the process of completing secondary education. Regarding competition level, 60.1% of athletes competed nationally, while 33.5% reported over a decade of sports involvement.

Anthropometric Characteristics

Body Mass Index (BMI), calculated from anthropometric measurements, revealed that 83.1% of participants were within the normal range (mean 22.58 ± 2.92), reflecting a generally healthy nutritional status. However, 12.1% were slightly overweight, and 4.8% were classified as underweight. These findings emphasize the importance of continuous monitoring and personalized nutritional interventions, particularly for athletes outside the normal BMI range, to optimize their performance and health outcomes (**Table 1**).

Table 1. Distribution of the participants by BMI values.

BMI (categories)	N/%	Gender		p
		Male (n/%)	Female (n/%)	
16-18	12 (4,8)	8 (4,5)	4 (5,6)	
18-25	206 (83,1)	141 (79,7)	65 (91,5)	**0,01***
26-30	30 (12,1)	28 (15,8)	2 (2,8)	
Total	**248 (100%)**	**177 (71,4)**	**71(28,6)**	

BMI – *22,58±2,92, p=0,01, p<0,05*

BMI – Body Mass Index; Overweight: BMI 25–29.9; Obese: BMI ≥30

A statistically significant difference in BMI was found between genders, with a significantly higher proportion of males classified as overweight (**Figure 1**).

Body Composition Analysis

The average total fat content was 14.97 ± 6.7, with a statistically significant difference between genders. The average visceral fat content was 2.92 ± 2.46, also significantly different between genders ($p < 0.001$). Female participants exhibited significantly higher levels of both total and visceral fat compared to male participants (**Table 2**).

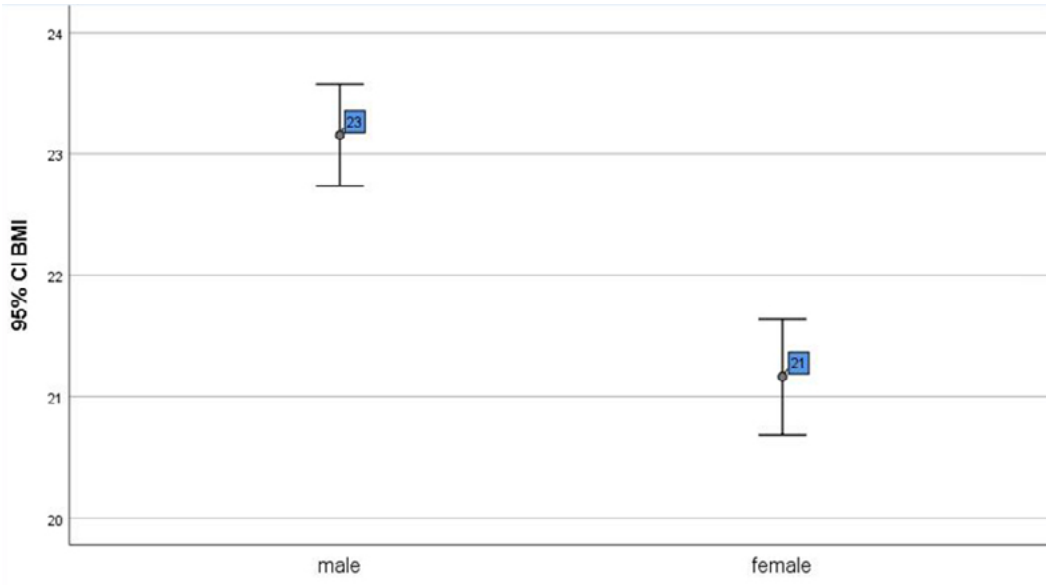

Figure 1. Comparison of BMI by Gender**.**

Table 2. Average fat and visceral fat values among respondents.

Gender	Fat	Visceral fat	p
Male	11.51±3.7	2.59±2.10	0.00*
Female	21.10±6.4	3.75±3.04	
Total mean values	14.97±6.7	2.92±2.46	

p=0.00, p<0.05

Table 3. Average knowledge level of respondents on proper nutrition principles.

The average knowledge level	N	Min	Max	Mean ± SD
	248	1	2	1.53±0.15

Nutritional Knowledge and Sources of Information

The largest proportion of participants (29.0%) reported obtaining nutrition information from personal trainers, followed by 20.2% from thematic and scientific journals, 14.6% from magazines, and only 5.2% from doctors. Notably, 31.0% of participants indicated they did not receive any nutrition information at all, and 88.7% reported never attending a nutrition course. Regarding dietary supplement use, 38.8% of participants reported taking supplements, with 33.0% doing so on their own initiative and 17.0% based on a doctor's recommendation.

Nutritional Knowledge Assessment

Participants' knowledge of proper nutrition principles was evaluated using 50 questions, with the percentage of correct answers ranging from 16.7% to 84.8%. The overall average score was 1.53 ± 0.15 (**Table 3**).

Sociodemographic Influences on Nutrition Knowledge

Gender significantly influenced participants' knowledge of nutrition ($p < 0.001$), with males demonstrating a lower level of knowledge compared to females. Education level also had a significant impact ($p = 0.02$); participants with a basic education scored lower on nutrition knowledge. Additionally, competition rank significantly affected nutrition knowledge ($p < 0.001$), with participants in international (Md = 74.00) and regional competitions (Md = 74.14) scoring higher than those in municipal (Md = 78.73) and national competitions (Md = 76.55). The source of nutrition information was a significant factor in knowledge levels ($p < 0.001$). Participants obtaining information from doctors (Md = 73.27) and personal trainers (Md = 74.86) demonstrated better knowledge compared to those relying on other sources (**Table 4**). No statistically significant effect of training length ($p = 0.43$) or region of residence on nutrition knowledge was observed.

T**able 4.** Influence of sociodemographic characteristics on nutrition knowledge.

Variable	%	Mean	p
Gender			
Male	71.4%	77.27±8.17	0.00*
Female	28.6%	74.24±6.24	
Education		**Median**	
Elementary education	10.5%	81.47	**0.02***
Secondary education	80.2%	76.00	
University/higher education	9.3%	76.00	
Competition rank		**Median**	
Municipal	21.0%	78.73	
International	2.4%	74.00	
National	60.1%	76.55	
Regional	16.5%	74.14	**0.00***
Source of information about nutrition		**Median**	
Magazines	14.6%	75.92	
Thematic and scientific journals	20.2%	75.40	**0.00***
Personal trainer	29.0%	74.86	
Doctor	5.2%	73.27	
Do not obtain information	31.0%	79.84	

Gender – U=607, z=-2.71, p=0.00 p<0.05
Education level – c^2 (4, n=248)=9.42, p=0.02, p<0.05
Competition rank – c^2 (3, n=248)=13.88, p=0.00, p<0.05
Source of information about nutrition – c^2 (4, n=275)=13.53, p=0.00, p<0.05

Correlation Between Knowledge and Body Composition

A Pearson correlation test showed no significant relationship between participants' overall knowledge of nutrition and their BMI, total body fat, or visceral fat levels (**Table 5**).

Table 5. Correlation of nutrition knowledge with BMI, total fat, and visceral fat.

	BMI	**Fat**	**Visceral fat**
Pearson linear correlation	-0.08	-0.78	-0.78
p	0.17	0.16	0.19

DISCUSSION

Balanced nutrition and regular physical activity are essential for good health. Sports, physical exercise, and an active lifestyle, along with the consumption of healthy foods, are fundamental for maintaining well-being and reducing the risk of diseases and other co-morbidities. Knowledge of nutrition is one of several factors needed to establish proper dietary habits, particularly for athletes [5]. Adequate training and balanced nutrition are essential for athletes. The contribution of sports nutritionists has become recognized as an integral part of high-performance sports teams. Their role includes promoting optimal nutrition and support, guiding, and educating athletes on inappropriate nutritional practices in line with their training goals and body composition [6].

According to our knowledge, this is the first study in Montenegro that has collected data to assess the knowledge status of athletes' nutrition in Montenegro. The sample of 248 participants from five towns included 71.4% males and 28.6% females.

Body Mass Index (BMI) is widely accepted in assessing obesity. Generally, athletes are often considered excellent examples of health and fitness. Although they engage in active exercise, athletes may still have a higher BMI, which can increase their total cholesterol and blood pressure [7]. Active sports and exercise can control BMI, body fat, and muscle mass and improve physical fitness [8]. Noonan's study presented that gender and participation in sports influence BMI and self-esteem in teenagers [9].

In summary, various studies indicate that a healthy and balanced BMI can be achieved through knowledge of proper nutrition and regular participation in sports or physical activities.

Most participants in this study (83.1%) have a normal BMI, which is better than that of athletes in Indonesia [10] and almost similar to that of the Kora Surabaya contingent team (82% normal) [11]. In Indonesia, most individuals have a normal BMI (62.5%), with some classified as overweight (21.9%)—higher than our findings, where 12.1% are overweight. Obesity rates are also higher in Indonesia at 11.4%, compared to 4.8% in our results.

The body composition of athletes at elite levels in this sport is a very important factor and receives significant attention in conditioning programs throughout the entire season at all competition levels [12]. The main focus of body composition in sports is to achieve a healthy and optimal body composition to enhance athletic performance and overall well-being. Exercise plays a crucial role in achieving and maintaining a healthy body composition [13]. Along with exercise, a balanced and nutritious diet is essential for achieving and maintaining a healthy body composition.

Body fat percentage is a measurement of the total fat mass in the body and is used to determine how much total body weight is made up of body fat. Active athletes often have a lower body fat percentage compared to the average person. Typically, male athletes will have between 6-13% body fat, and female athletes have 14-20% body fat according to the WHO [7]. The average body fat percentage of the athletes in this study was 14.97 ± 6.7, with statistically significantly higher body fat among female athletes ($p = 0.00$). The average values of body fat percentage in boys in the study conducted in Kosovo show that the athletes are in a higher optimal zone [14]. In Indonesian athletes, the percentage of normal body fat is 14.67%, over 50.45% are overweight, and 11.45% are obese, with 68.61% being underweight. The average female body fat percentage is almost twice that of males. There is a significant correlation between BMI and body fat percentage [15].

Professional athletes, especially to a great extent, rely on optimal nutrition to support their rigorous training regimens, optimize performance, and promote faster recovery. However, a lack of understanding of proper nutritional principles can hinder athletes from achieving their full potential and reaching top-level performance. In line with the Olympic motto "Citius, Altius, Fortius", traditional research focus in the field of sports nutrition has been on strategies that can improve performance on the day of competition [16]. Sports supplements (SS) are substances used by athletes to enhance athletic performance, though not all of them have ergogenic effects. In the first half of the 20th century, the classification of SS was primarily based on food materials, mainly founded on chemical characteristics (such as carbohydrates, proteins, fats, vitamins, minerals, creatine, etc.). In recent decades, functional classification has gained prominence.

This functional classification of sports supplements (SS) includes groups based on the main effect of each substance: stimulants, energy supplements, buffers, anti-inflammatory agents, etc, although some are difficult to classify, such as iron [17]. Sports supplements are used by 38.8% of athletes. There is a statistical significance in their usage based on gender ($p = 0.03$). Male athletes use more supplements than female athletes.

Regarding the main source of information for determining the type, use, and benefits of sports supplements (SS), this study shows that dietitians/nutritionists, who play a primary role in advising on SS consumption, are the least consulted by athletes. Only 17.0% of the respondents take sports supplements based on the advice of a doctor. These data are similar to those from studies indicating that dietitians or nutritionists advised less than 15% of the total sample [18]. Carey noted that among the nutritional supplements taken by 52% of the athletes, multivitamins were the most commonly reported [19].

Among athletes who reported using dietary supplements, the majority (33.0%) uses them independently. Supplements are used by 13.8% of participants based on the recommendation of a personal trainer, 17% based on a doctor's recommendation, and 6.4% receive advice from their parents. It is encouraging to note that, compared to their colleagues, a higher percentage consult with a trainer, doctor, and parents before taking dietary supplements. In Croatia, only 2.9% of athletes consult with a doctor or nutritionist before taking dietary supplements [20].

Various studies highlight disparities in knowledge about nutrition among different athlete populations. Vásquez-Espino and co-authors found a low average result among professional footballers in Spain [21]. The percentage of correct answers regarding athletes' knowledge of proper nutrition and supplementation ranged from 16.7% to 84.8%. The overall average knowledge of nutrition and perceptions of adequate nutrition is 1.53 ± 0.15.

The low level of nutrition knowledge among participants may be influenced by the sources of nutrition information, as 31.0% of participants reported being uninformed about their current nutrition. Of those who do receive information, 29.0% get it from a personal trainer, nearly a quarter (20.2%) from thematic and scientific journals, 14.6% from popular magazines, and 5.2% from doctors or dietitians. The overall results of the nutrition study in Arabs showed that about 77% of the participants in this study had poor nutrition knowledge, whether they were athletes or recreational athletes [22]. Ahmadi et al. noted a moderate level of nutrition knowledge (66%) among secondary school athletes in Tehran [23]. In Jordan, 55.3% of the population of athletes and athletic trainers had poor nutrition knowledge. College athletes in the United States (CTFT) in addition to formal sources, reported using numerous other resources for "informal" nutrition education. Informal nutrition education indicates a more relaxed, casual style of obtaining information directed at athletes [24]. Many CTFTs (87.4%, n=235) indicated that coaches were a source of current nutrition information, and 87.4% (n=231) indicated they used the internet. Closely following, 71.4% (n=192) of participants indicated they utilized a physician, and 65.8% (n=177) indicated that they relied on friends and teammates as a nutrition resource. Serhan *et al.* noted inadequate nutrition knowledge (mean less than 75%) among athletes in universities in Lebanon [25], while Sunuwar et al. found that over half of the Nepalese Taekwondo players had poor nutrition knowledge [26].

Regarding nutrition and elite athletes, it is essential that the exercise session's purpose is clearly defined in the days and hours leading up to the session to maximize its effect or adaptation. Here's a refined version of the sentence for clarity and flow: It is also important for trainers and athletes to recognize the value of nutrition strategies in improving performance and adaptation.

CONCLUSION

Athletes who participated in this study demonstrated insufficient knowledge of proper nutrition and the role of specific nutrients in the body. The assessment of their nutritional status, based on BMI, revealed that over 80% of athletes had a normal nutritional status, while female athletes showed statistically higher body fat percentages and faced more weight-related challenges compared to their male counterparts.

These findings underscore the critical need for structured and tailored nutrition education programs within sports clubs. Particular emphasis should be placed on individual nutritional planning that reflects the unique demands of different sports disciplines, training intensities, and personal goals. Collaboration among club physicians, dietitians, trainers, and athletes is vital for implementing effective dietary regimens that enhance performance and overall health.

Furthermore, the prevalence of self-guided dietary supplement use highlights the importance of professional guidance in supplement selection and use. Integrating nutrition education into regular training programs could help athletes make informed dietary decisions, optimize their performance, and reduce the risk of injuries.

Finally, fostering a culture of continuous learning and professional support in sports nutrition is essential. Such initiatives will not only enhance athletic performance but also contribute to the long-term health and well-being of athletes, ensuring their success both on and off the field.

AUTHOR CONTRIBUTIONS

SBL and SP were responsible for conducting the study, its design, coordination, and manuscript editing. IJ and IB were responsible for the analysis of dietary data, data presentation, review, and editing of the manuscript. SP and SBL participated in data collection and review. SBL was also responsible for statistical analysis and data processing. IJ was involved in conceptualization/study design, methodology, manuscript preparation, review, and editing. All authors contributed to the article and approved the final version for publication.

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Znanje i navike o ishrani i nutritivni status crnogorskih sportista: fokus na opštu i sportsku ishranu

Snezana Barjaktarovic-Labovic[1], Snezana Pantovic[2,] Ivana Joksimovic[1], Ines Banjri[3]

[1]Institut za javno zdravlje Crne Gore, Podgorica, Crna Gora

[2]Medicinski fakultet, Univerzitet Crne Gore, Podgorica, Crna Gora

[3]Fakultet za prehrambenu tehnologiju, Univerzitet Josip Juraj Strossmayer, Osijek, Hrvatska

Kratak sadržaj

Procjena nutritivnog statusa sportista predstavlja ključan aspekt unapređenja sportskih performansi, očuvanja zdravlja i smanjenja rizika od povreda. Nutritivni status pruža sveobuhvatan uvid u navike u ishrani i potrebe sportista, omogućavajući prilagođavanje unosa energije i hranjivih materija u skladu sa specifičnostima pojedinog sporta, intenzitetom treninga i individualnim ciljevima. Akcenat se vrlo često stavlja samo na atletsku komponentu treninga, dok se nutritivni faktor neopravdano zanemaruje. Cilj istraživanja je ispitati znanje sportista o pravilnoj ishrani i suplementaciji. Podcilj istraživanja je da se na osnovu antropometrijskih parametara proceni nutritivni status sportista iz ispitivane grupe. Studija preseka sprovedena je u pet gradova u Crnoj Gori (Podgorica, Bar, Berane, Budva i Bijelo Polje) u 2022. godini. BMI izračunat antropometrijskim merenjima (22,58±2,92) bio je kod 83,1% ispitanika u normalnom opsegu, prekomernu težinu nalazimo kod 12,1% ispitanika, dok je pothranjenost zabeležena kod 4,8% ispitanika. Više od trećine ispitanika (38,8%) navodi da koristi dodatke ishrani, gde najveći procenat ispitanika (33,0%) navodi da dodatke ishrani uzima na „svoju ruku", dok 17,0% ističe da uzima po preporuci lekara. Procenat tačnih odgovora kretao se od 16,7% do 84,8%. Ukupna prosečna vrednost tačnih odgovora iznosila je 1,53±0,15. Pronađen je statistički značajan uticaj pola, stepena obrazovanja, ranga takmičenja i izvora informisanosti o ishrani na stepen znanja ispitanika o ishrani. Nije utvrđena korelacija između BMI i ukupnog znanja ispitanika o ishrani, kao ni korelacija između ukupnog znanja ispitanika i prisustva masti. Rezultati istraživanja pokazuju da integrisani pristup ishrani, zasnovan na preciznim procenama nutritivnog statusa i edukacija, značajno doprinosi boljim sportskim performansama i zdravlju sportista, te se isti preporučuju kao standard u sportskoj praksi. Edukacija o ishrani i podrška sertifikovanih nutricionista u sportskim klubovima mogli bi da igraju ključnu ulogu u postizanju ovog cilja. Uz bolje razumevanje ishrane, sportisti mogu da donose informisane izbore hrane i optimizuju svoje performanse, na kraju doprinoseći svom ukupnom zdravlju i uspehu u svojim sportovima.

Ključne riječi: *nutritivni status; sportske performanse; edukacija sportista; pravilna ishrana; suplementacija.*