Original Article
Nutrition

Medical Journal of Islamic World Academy of Sciences
doi:** 10.5505/ias.2024.48208* ***2024;31(1): 1-8

Sports Nutrition Knowledge and Dietary Habits of Students at Faculty of Sports Sciences

Rahime E. KARAKAYA[1], Fatımah M.A. ABBAS[1]

[1] Department of Nutrition and Dietetics, Faculty of Health Sciences, Ankara Yıldırım Beyazıt University, Ankara, Türkiye

Correspondence
Rahime Evra KARAKAYA
Ankara Yıldırım Beyazıt Üniversitesi, Esenboga Külliyesi, Dumlupınar Mahallesi, Çubuk/Ankara, Türkiye
e-mail: evracakir1@gmail.com

ABSTRACT

This study aimed to assess the level of sports nutrition knowledge and dietary habits of 117 students at the Faculty of Sports Sciences. The Nutrition for Sport Knowledge Questionnaire (NSKQ) was used to measure the sports nutrition knowledge of students, whereas dietary habits were assessed using a 24-h dietary recall. The results revealed that 74.4% of students demonstrated poor sports nutrition knowledge. The NSKQ scores were not significantly correlated with energy and macronutrient and micronutrient intake, except for a negative correlation with vitamin A intake ($r = -0.190$, $P = 0.040$). Further, the students' NSKQ scores did not significantly affect the use of ergogenic aids ($P > 0.05$). This study showed that sports sciences students had poor nutrition knowledge, which did not significantly affect dietary intake and use of ergogenic aids. Further studies are needed to explore the correlation between nutrition knowledge, dietary practices, and dietary intake of students at the Faculty of Sports Sciences.

Keywords: Dietary habits, nutrition knowledge, sports, student

INTRODUCTION

Sports nutrition is a multidisciplinary field involving healthy eating practices to optimize athletic performance, supported by disciplines such as exercise biochemistry and physiology. Sports nutrition affects important factors such as the health, body weight, body composition, recovery time, and exercise performance of athletes (1,2). The aim of sports nutrition is to develop appropriate nutrition strategies to increase exercise capacity, reduce the risk of injury, speed up the recovery process, and achieve optimal performance for athletes. Tailoring a nutrition plan to the specific needs of athletes is crucial to enhance exercise capacity and maximize performance. This involves optimizing body composition, ensuring adequate energy, protein, and carbohydrate intake, maintaining proper hydration, balancing vitamins and minerals, and using ergogenic aids (3, 4, 5).

The energy and nutrient requirements of individuals who exercise are different from those of sedentary individuals. Macronutrients such as carbohydrates, proteins, and fats are essential for meeting the increased energy needs during exercise. Carbohydrates, in particular, delay fatigue and increase endurance during exercise. Adequate protein intake facilitates the repair of damaged muscle tissue and the formation of new muscle fibers. The intake of carbohydrates, proteins, and fluids after exercise can reduce recovery time and muscle soreness. Micronutrients with antioxidant properties, such as vitamins C and E, can reduce exercise-induced inflammation and muscle damage, whereas calcium and vitamin D can enhance bone health and lower the risk of fractures (5,6).

Students in the field of sports sciences often face time and space constraints while preparing healthy meals due to their involvement in academic programs and training. They also encounter financial constraints, making it difficult to buy healthy foods, coupled with a lack of skills in planning and preparing meals. Hence, students tend to skip meals or resort to unhealthy snacks (7,8). Understanding the nutrition knowledge and dietary habits of student athletes is essential for improving their athletic performance (9). Inadequate nutrition knowledge among students can negatively affect both healthy eating habits and sports performance (10). However, university students engaged in sports professionally lack adequate knowledge of sports nutrition (11,12). A study involving student athletes showed that a majority of students (88.6%) had poor sports nutrition knowledge (13). Adequate nutrition knowledge among students at the Faculty of Sports Sciences can enhance their own dietary habits potentially leading to improved athletic performance.

This study firstly hypothesized that students at the Faculty of Sports Sciences have a high level of sports nutrition knowledge. Second hypothesis is that nutrition knowledge positively influences their dietary intake. And third hypothesis is that nutrition knowledge positively influences use of ergogenic aids. The aim of this study was to evaluate the level of sports nutrition knowledge, dietary intake, and dietary habits of students at the Faculty of Sports Sciences.

MATERIAL AND METHODS

Research model

This cross-sectional study involved 117 students aged 19–30 years from the Faculty of Sports Sciences at Ankara Yıldırım Beyazıt University who voluntarily participated between January and June 2023. Ethical approval for the study was granted by the Health Sciences Ethics Committee of Ankara Yıldırım Beyazıt University under decision number 19-1247 on 08/12/2022. The sample size for the study was determined using G*Power 3.1 to be 117 participants, with a 5% margin of error and 80% power.

Data collection tools

The research data were obtained by researchers using a face-to-face questionnaire. The questionnaire form included the following components:

Sociodemographic characteristics: Details on age, sex, department of study, and class level were obtained.

Dietary habits: The number of daily main and snack meals of students and their use of ergogenic aids were recorded.

Anthropometric measurements: Students self-reported their own body weight (kg) and height (cm), which were then used to calculate body mass index (BMI) using the following formula: weight (kg)/height (m^2). The resulting BMI values were classified based on the criteria set by the World Health Organization (14).

The Nutrition for Sport Knowledge Questionnaire: The original name of the scale is "The Nutrition for Sport Knowledge Questionnaire (NSKQ)." It was developed by Trakman and colleagues (15) in 2017 to determine the sports knowledge of nutrition among adult athletes. Çırak and Çakıroğlu performed the Turkish validity and reliability assessment of the scale (16). For overall performance in NSKQ, the knowledge scores were calculated from correct answers and evaluated using the scoring system (68 items considered as 100). According to this system, "Poor" knowledge level (0%–49%), "Average" knowledge level (50%–65%), "Good" knowledge level (66%–75%), and "Excellent" knowledge level (76%–100%) were accepted.

24-h dietary recall: Retrospective 24-h dietary recalls were used to evaluate the eating habits of students. Daily energy, macronutrient, and micronutrient intakes were determined using the Nutrition Information System (Beslenme Bilgi Sistemi-BeBis) program (17).

Data Analysis

Statistical analyses of data were performed using IBM SPSS Statistics v26 in a computer-based environment. Frequency tables and descriptive statistics (mean ± standard deviation, $X \pm SD$) were used for analysis. The Kolmogorov–Smirnov test was used to assess normal distribution.

The independent-sample t test was employed to compare measurement values between two independent groups with normal quantitative data. One-way analysis of variance was used for comparisons involving more than two independent groups. For data lacking normality, the Mann–Whitney *U* test was applied to compare two independent groups, whereas the Kruskal–Wallis test was used for comparing more than two independent groups. The Pearson correlation coefficient was used to examine the correlation between two quantitative variables with normal distribution; and the Spearman correlation coefficient was used because at least one quantitative variable did not have a normal distribution. A logistic regression model was run to measure the multivariate correlations between variables. A notable threshold of $P < 0.05$ was set for all statistical analyses.

RESULTS

A total of 117 students [52 female (44.4%) and 65 male (55.6%)] participated in the study. The results showed that 64.1% of the students ate three main meals a day, whereas 41.9% stated that they had two snacks a day. Also, 21.4% of the students used ergogenic aids, with products such as protein powder (14.7%), glutamine (5.1%), creatine derivatives (10.3%), branched-chain amino acids (6.0%), and omega-3 (6.0%) among them. Moreover, 75.2% of the students were of normal weight, whereas 18.8% were overweight. A significant difference was observed in NSKQ scores according to the department of study of the students ($P = 0.005$). The NSKQ score of the coaching education department was significantly

different from that of the sports management department (P = 0.004), and the NSKQ score of the exercise and sport sciences department was significantly different from that of the sports management department (P = 0.003). No significant differences were found in NSKQ scores based on sex, class, number of main meals and snacks, and the use of ergogenic aids (P > 0.05) (Table 1).

As shown in Table 2, a weak negative correlation was found between NSKQ score and daily vitamin A intake (r = –0.190, P = 0.040), whereas no statistically significant correlation was found with energy, other nutrients, and BMI (P > 0.05).

Table 1 Comparison of The Nutrition for Sport Knowledge Questionnaire scores based on the demographic characteristics and dietary habits of students

	NSKQ		
	***N* (%)**	**Mean ± SD**	***P***
Sex			0.522
Female	52 (44.4)	26.79 ± 8.54	
Male	65 (55.6)	27.81 ± 8.66	
Department			0.005**
Coaching education	58 (49.6)	28.57 ± 8.68[a]	
Exercise and sport sciences	33 (28.2)	29.00 ± 7.66[b]	
Sports management	26 (22.2)	22.58 ± 8.92[a,b]	
Class			0.483
1	33 (28.2)	25.88 ± 8.24	
2	43 (36.8)	26.98 ± 9.27	
3	22 (18.8)	29.05 ± 6.63	
4	19 (16.2)	28.84 ± 9.57	
Number of main meals			0.358
Less than 3	42 (35.9)	26.38 ± 7.90	
3	75 (64.1)	27.91 ± 8.84	
Number of snacks			0.120
None	13 (11.1)	27.77 ± 8.40	
1	40 (34.2)	26.20 ± 9.02	
2	48 (41.9)	28.06 ± 8.09	
3	16 (13.7)	27.81 ± 9.52	
Use of ergogenic aids			0.773
Using	25 (21.4)	27.80 ± 9.47	
Not using	92 (78.6)	27.24 ± 8.37	
Ergogenic aids used*			
Protein powder	17 (14.7)		
Glutamine	6 (5.1)		
Creatine derivatives	12(10.3)		
BCAAs	7 (6.0)		
Omega-3	7 (6.0)		
BMI (kg/m²) (mean ± SD; 22.78 ± 2.80)			0.118
Underweight	5 (4.3)	28.20 ± 5.26	
Normal weight	88 (75.2)	26.86 ± 8.85	
Overweight	22 (18.8)	30.14 ± 7.30	
Obese	2 (1.7)	16.50 ± 7.78	
NSKQ (mean ± SD; 27.36 ± 8.58)			
Poor	87 (74.4)		
Average	28 (23.9)		
Good	2 (1.7)		

**P < 0.01. *Multiple responses were given. a,bValues denoted by the same letter in the same column are significantly different. BCAAs, Branched-chain amino acids; BMI: body mass index; NSKQ, The Nutrition for Sport Knowledge Questionnaire.

Table 2 Correlation between The Nutrition for Sport Knowledge Questionnaire scores and dietary energy, macronutrient and micronutrient intakes, and BMI of students

	NSKQ	
	r	*P*
Energy (kcal)	–0.093	0.316
Carbohydrate (g)	–0.139	0.135
Carbohydrate (%)	–0.053	0.567
Protein (g)	–0.111	0.233
Protein (%)	–0.090	0.332
Fat (g)	–0.004	0.963
Fat (%)	0.106	0.255
Total fiber (g)	0.013	0.885
Soluble fiber (g)	0.035	0.709
Insoluble fiber (g)	–0.143	0.125
Vitamin A (µg/RE)	–0.190	0.040*
Vitamin E (mg)	0.016	0.867
Thiamine (mg)	–0.151	0.104
Riboflavin (mg)	–0.136	0.144
Niacin (mg)	–0.076	0.417
Vitamin B6 (mg)	–0.065	0.484
Folate (mcg)	–0.163	0.079
Vitamin B12 (mcg)	0.045	0.628
Vitamin C (mg)	0.017	0.857
Sodium (mg)	0.019	0.843
Potassium (mg)	–0.156	0.094
Calcium (mg)	–0.051	0.583
Magnesium (mg)	–0.155	0.096
Phosphorus (mg)	–0.092	0.322
Iron (mg)	–0.112	0.230
Zinc (mg)	–0.111	0.235
BMI (kg/m²)	0.099	0.289

*$P < 0.05$. BMI, Body mass index; NSKQ, The Nutrition for Sport Knowledge Questionnaire

The department of study, number of main meals, and NSKQ score exhibited no significant effect on the use of ergogenic aids ($P > 0.05$). Male students were 4.552 times more likely than female students to use ergogenic aids, those consuming three snacks were 9.461 times more likely than non-snackers, and second-year students were 0.072 times less likely than first-year students to use ergogenic aids ($P < 0.05$) (Table 3).

DISCUSSION

The results showed that most (74.4%) of the students had poor sports nutrition knowledge; hence, Hypothesis 1 was rejected. NSKQ scores were not significantly correlated with energy, macronutrient, and micronutrient intake, except for a negative correlation with vitamin A intake ($r = –0.190$, $P = 0.040$); hence, Hypothesis 2 was rejected. The level of sports nutrition knowledge also did not affect the use of ergogenic aids, leading to the rejection of Hypothesis 3.

Sufficient nutrition knowledge is associated with diet quality and is one of the most important factors that can improve the training requirements, performance, and recovery of athletes (12). Studies have shown that the level of nutrition knowledge is inadequate in university

Table 3 Logistic regression analysis of factors affecting the use of ergogenic aids among students

							95% CI	
Risk factor	**β**	**SE**	**Wald**	**df**	***P***	**OR**	**Lower**	**Upper**
Sex (female)	1.516	0.680	4.962	1	0.026*	4.552	1.200	17.272
Class (second)	–2.624	0.860	9.306	1	0.002**	0.072	0.013	0.391
Snacks (3)	2.247	1.109	4.109	1	0.043*	9.461	1.077	83.081

*$P < 0.05$, **$P < 0.01$. **β**, Regression coefficient; CI, confidence interval; df, degrees of freedom; OR, odds ratio; *P*, significance level; SE, standard error; Wald, Wald value.

students who exercise (18, 19). Athletes generally have insufficient knowledge in areas such as energy, macronutrients and micronutrients, dietary supplements, dietary fat sources, and weight management (9). A study conducted with first- and fourth-year students at the Faculty of Sports Sciences showed that 65.6% of the students had poor nutrition knowledge, whereas 23.0% had excellent nutrition knowledge (20). Similarly, the majority of students studying in sports sciences faculties (95.8%) had poor sports nutrition knowledge (21). Factors such as age, sex, type and duration of sport, and field of study affect the level of nutrition knowledge among students who exercise (22). Female students had a higher level of sports nutrition knowledge than male students. However, the level of nutrition knowledge was similar among departments and class levels in the sports sciences faculty (23). Another study conducted with students studying sports management demonstrated the level of nutrition knowledge of female students to be higher than that of male students (13). Unlike these studies, Andrew *et al.* (10) showed that the levels of sports nutrition knowledge of university students were similar based on sex, type of sport, and class level. Uzlu *et al.* (24) examined the students at the School of Physical Education and Sports and found that the level of nutrition knowledge was similar based on sex and class level. This study revealed that 74.4% of the students had a poor level of sports nutrition knowledge, consistent with other studies. Sports nutrition knowledge was similar based on sex, class, number of main and snack meals, and use of dietary supplements. Also, the average knowledge level of students studying in the sports management department was lower than the knowledge level of those studying in the coaching education and exercise and sports sciences departments. Based on these findings, it was presumed that the level of overall sports nutrition knowledge of students in the sports sciences faculty was poor. More studies should be conducted to compare the levels of sports nutrition knowledge of students based on their demographic characteristics and department of study.

The health and performance of athletes whose dietary requirements are not met are negatively impacted. Athletes with inadequate protein intake may experience muscle loss, whereas individuals with inadequate energy intake may experience weight loss. The athletes are unable to meet their dietary needs due to factors such as sex, socioeconomic status, type of sport, taste perception, use of dietary supplements, lack of nutrition education, and insufficient nutrition knowledge (25). Athletes with sufficient nutrition knowledge prefer consuming healthier foods and have better diet quality (26). Nutrition education interventions in athletes increase their levels of nutrition knowledge and diet quality, reduce body fat mass, increase muscle mass, and improve performance (27,28). In a previous study, a negative correlation ($r = –0.06$, $P < 0.05$) was observed between the level of sports nutrition knowledge and dietary sodium intake of adolescent soccer players, and a positive correlation ($r = 0.028$, $P < 0.05$) was detected between calcium intake and the level of nutrition knowledge (27). Jenner *et al.* (29) revealed a positive correlation between the level of nutrition knowledge and dietary calcium ($r = 0.43$, $P = 0.004$), fiber ($r = 0.51$, $P = 0.001$), and protein ($r = 0.35$, $P = 0.02$) intake in Australian football players. In another study, a positive correlation was observed between sports nutrition knowledge and dietary energy intake ($r = 0.046$, $P = 0.014$), carbohydrate intake ($r = 0.043$, $P = 0.039$), and lean soft tissue mass ($r = 0.051$, $P = 0.039$) in athletes (30). However, a weak correlation has been reported between the level of nutrition knowledge and nutrient intake through diet (25). Suherman *et al.* (31) found that the level of nutrition knowledge in handball players had a weak but notable effect on their dietary habits. Jagin *et al.* (32) examined the correlation between the level of nutrition knowledge and body composition and found a negative

correlation between sports nutrition knowledge score and body fat percentage and mass in athletes. However, a study involving young athletes reported no correlation between the level of nutrition knowledge and body fat ($P > 0.05$) (33). This study detected no obvious correlation between students' sports nutrition knowledge score and dietary energy, macronutrient and micronutrient intake, and BMI values, except for dietary vitamin A intake ($r = -0.091$, $P = 0.040$) ($P > 0.05$). This might be due to poor sports nutrition knowledge of the majority of students. However, psychological, environmental, and biological factors such as eating disorders, perceived body image, hedonic hunger, and socioeconomic level may also influence individuals' eating behavior and body composition (34). Therefore, the correlation between sports nutrition knowledge, diet, and body composition in individuals who exercise should be explored.

Dietary ergogenic aids are products used by athletes to increase endurance, enhance muscle mass and fat burning, accelerate recovery, and reduce injuries and fatigue. These products include vitamins, minerals, amino acids, metabolites, and so forth, which can be added to athletes' diets as supplements. Proteins, fats, caffeine, creatine, nitrate, taurine, beta-alanine, glutamine, antioxidants, essential amino acids, various vitamins, and mineral supplements are reported to affect athlete performance (35,36,37). A previous study stated that 90.6% of university students who exercised used dietary supplements, and the usage increased with higher class levels. However, age, sex, and type of sport did not affect the use of dietary supplements (38). Another study showed that 58.3% of students who exercised had used at least one type of dietary supplement in the last 6 months, with men and students aged more than 20 years using more products than women and those aged less than 20 years (39). In a different study, 15.3% of male students who exercised used dietary supplements, with the most preferred products being creatine, protein supplements, ginseng, multivitamins, calcium, and vitamin D (40). Vinnikov *et al.* (41) found that 29% of university students engaged in recreational sports used dietary supplements, with vitamins being the most commonly used products. In the same study, age and a low-fat diet influenced the use of dietary supplements, whereas income level did not. In another study, the intake of micronutrient supplements among university students was found to be similar based on sex and type of sport practiced (42). In this study, 21.4% of students used ergogenic aids, with the most commonly used products being protein powders and creatine derivatives. The factors influencing the use of ergogenic aids were being a male student, being in the first year, and having three snacks a day. When this study and previous studies were evaluated, the frequency and type of ergogenic aids used varied among university students who exercised. Based on these findings, it is presumed that the use of dietary supplements is higher in men than in women. The higher usage among individuals consuming three snacks a day suggests that the use of dietary supplements may be more common in students with healthy eating habits or in those who pay attention to healthy eating. However, the level of sports nutrition knowledge did not affect the use of ergogenic aids. Hence, students use products regardless of their knowledge level, and increasing their level of nutrition knowledge is essential for making healthy choices in the use of ergogenic aids.

In conclusion, this study found that the level of nutrition knowledge of students at the Faculty of Sports Sciences was poor. No correlations were found between the levels of nutrition knowledge and dietary intakes of individuals, except for vitamin A. Also, NSKQ scores did not affect ergogenic aid use. It is important for students at the Faculty of Sports Sciences to participate in nutrition education, seminars, and similar programs during their studies to enhance their levels of nutrition knowledge. Thus, the correlation between the levels of nutrition knowledge and dietary habits of athletes needs further investigation.

ACKNOWLEDGMENTS

The authors thank all the students who participated in the study.

REFERENCES

1. Şeker ŞEG. Sporcu Beslenmesi. Hatiboğlu Yayıncılık. Ankara: Çankaya, 2020.
2. Türkiye Beslenme Rehberi (TÜBER) 2022" Sağlık Bakanlığı, Halk Sağlığı Genel Müdürlüğü, Sağlık Bakanlığı Yayın No:1031, Ankara 2022.
3. Benardot D. Advanced sports nutrition. Human Kinetics Publishers: Champagne, IL, 2021.
4. Ersoy G. Sporcular için beslenme. Ankara: Çankaya, Ankara Nobel Tıp Kitabevleri, 2021.
5. Gunes-Bayir A & Çemberci M. (2023). Association between nutrition knowledge and nutrition practice among Malaysian adolescent handball athletes. Arch Sports Med Physiother 2023; 8(1):003-010.

6. Saura RA, Rentero MPZ & Hernández JM. Sports Nutrition and Performance. İçinde Nutrition in Health and Disease-Our Challenges Now and Forthcoming Time. IntechOpen., 2019.
7. Göral K & Yıldırım D. Spor bilimleri fakültesi öğrencilerinin sağlıklı beslenmeye ilişkin tutumlarının branş farklılıklarına göre araştırılması. CBÜ Beden Eğitimi ve Spor Bilimleri Dergisi 2022; 17(1):58-69.
8. Yılmaz G, Şeker R & Şengür E. Determination of athlete nutrition knowledge level of university students: Üniversite öğrencilerinin sporcu beslenme bilgi düzeylerinin belirlenmesi. Journal of Human Sciences 2021; 18(4):760-771.
9. Trakman GL, Forsyth A, Devlin BL & Belski R. A systematic review of athletes' and coaches' nutrition knowledge and reflections on the quality of current nutrition knowledge measures. Nutrients 2016; 8(9):570.
10. Andrews A, Wojcik JR, Boyd JM, & Bowers CJ. Sports Nutrition Knowledge among Mid-Major Division I University Student-Athletes. Journal of nutrition and metabolism 2016; 1:3172460. https://doi.org/10.1155/2016/3172460
11. Danh JP, Nucci A, Andrew Doyle J, & Feresin RG. Assessment of sports nutrition knowledge, dietary intake, and nutrition information source in female collegiate athletes: A descriptive feasibility study. Journal of American College Health 2023; 71(9):2717-2725. https://doi.org/10.1080/07448481.2021.1987919.
12. Klein DJ, Eck KM, Walker AJ, Pellegrino JK & Freidenreich DJ. Assessment of sport nutrition knowledge, dietary practices, and sources of nutrition information in NCAA division III collegiate athletes. Nutrients 2021; 13(9):2962.
13. Uluç S & Durukan E. Spor yönetimi bölümünde öğrenim gören öğrencilerin sağlıklı beslenmeye ilişkin tutum düzeylerinin incelenmesi. Akdeniz Spor Bilimleri Dergisi 2021; 4(3):438-446.
14. WHO Consultation on Obesity (1999: Geneva, Switzerland) & World Health Organization. (2000). Obesity: preventing and managing the global epidemic: report of a WHO consultation. World Health Organization.
15. Trakman, GL, Forsyth A, Hoye R & Belski R. The nutrition for sport knowledge questionnaire (NSKQ): development and validation using classical test theory and Rasch analysis. Journal of the International Society of Sports Nutrition 2017; 14:1-11.
16. Çırak O & Çakıroğlu FP. Sporcu Beslenme Bilgisi Ölçeğinin Türkçe Formunun Geçerlik Ve Güvenirlik Çalışması. Ankara Sağlık Bilimleri Dergisi 2019; 8(1):35-49.
17. Ebispro for Windows, Stuttgart, Germany; Turkish Version (BeBiS 9), Pasifik Elektirik Elektronik Ltd. Şti. (www.bebis.com.tr); Istanbul, 2021.
18. Elsahoryi NA, Trakman G & Al Kilani A. General and sports nutrition knowledge among Jordanian adult coaches and athletes: A cross-sectional survey. PloS one 2021; 16(11):e0258123.
19. Ozdoğan Y & Ozcelik AO. Evaluation of the nutrition knowledge of sports department students of universities. Journal of the International Society of Sports Nutrition 2011; 8(1): 11. https://doi.org/10.1186/1550-2783-8-11.
20. Fadıloğlu A. Spor bilimleri fakültesi 1. ve 4. Sınıf öğrencilerinin beslenme alışkanlıkları, sporcu beslenme bilgi düzeyi ve antropometrik ölçümlerinin değerlendirilmesi. Master's Thesis, Hasan Kalyoncu University, Institute of Health Sciences, Department of Nutrition and Dietetics, Turkey: Gaziantep, 2021.
21. Solsun BG. Aksaray üniversitesi spor bilimleri fakültesi öğrencilerinde sporcu beslenmesi bilgi düzeyi ve beslenme alışkanlıkları ile ilişkili etmenler. Necmettin Erbakan University, Institute of Health Sciences, Department of Public Health, Turkey: Konya, 2021.
22. Masud-ur-Rahman M, Kamruzzaman M, Sultana N & Rahman SS. Determinants of nutrition knowledge, attitude and practices of adolescent sports trainee: A cross-sectional study in Bangladesh. Heliyon 2021; 7(4).
23. Çakır Z & Coşkuntürk OS. Beden Eğitimi ve Spor Yüksekokulunda Öğrenim Gören Öğrencilerin Sporcu Beslenme Bilgi Düzeylerinin Bazı Değişkenler Açısından İncelenmesi. Ulusal Spor Bilimleri Dergisi 2022; 6(2):105-118.
24. Uzlu G, Akgöz HF, Yalçın S, Çöl BG & Koç M. Sporcu üniversite öğrencilerinin beslenme bilgi düzeylerinin ölçülmesi. İstanbul Gelişim Üniversitesi Sağlık Bilimleri Dergisi, 2021; 14:227-240.
25. Janiczak A, Devlin BL, Forsyth A & Trakman GL. A systematic review update of athletes' nutrition knowledge and association with dietary intake. British Journal of Nutrition. British Journal of Nutrition 2022; 128(6):1156-1169.
26. Sánchez-Díaz S, Yanci J, Castillo D, Scanlan AT & Raya-González J. Effects of nutrition education interventions in team sport players. A systematic review. Nutrients 2020; 12(12):3664.
27. Noronha DC, Santos MI, Santos AA, Corrente LG, Fernandes RK, Barreto AC, Santos RG, Santos RS, Gomes, P & Nascimento MV. Nutrition knowledge is correlated with a better dietary intake in adolescent soccer players: A cross-sectional study. Journal of nutrition and metabolism 2020; 3519781.
28. Rossi FE, Landreth A, Beam S, Jones T, Norton L & Cholewa JM. The effects of a sports nutrition education intervention on nutritional status, sport nutrition knowledge, body composition, and performance during off season training in NCAA Division I baseball players. Journal of sports science & medicine 2017; 16(1):60.
29. Jenner SL, Trakman G, Coutts A, Kempton T, Ryan S, Forsyth A & Belski R. Dietary intake of professional Australian football athletes surrounding body composition assessment. Journal of the International Society of Sports Nutrition 2018; 15(1):43. https://doi.org/10.1186/s12970-018-0248-5.
30. Devlin BL, Leveritt MD, Kingsley M, & Belski R. Dietary intake, body composition, and nutrition knowledge of Australian football and soccer players: Implications for sports nutrition professionals in practice. International journal of sport nutrition and exercise metabolism, 2017; 27(2):130-138.
31. Suherman A, Low JFL, Jusoh N, Tengah RY & Azmi SH. Association between nutrition knowledge and nutrition practice among Malaysian adolescent handball athletes, 2021.
32. Jagim AR, Fields JB, Magee M, Kerksick C, Luedke J, Erickson J & Jones MT. The influence of sport nutrition knowledge on body composition and perceptions of dietary requirements in collegiate athletes. Nutrients 2021; 13(7):2239.
33. Magee MK, Jones MT, Fields JB, Kresta J, Khurelbaatar C, Dodge C, Merfeld B, Ambrosius A, Carpenter M & Jagim AR. Body composition, energy availability, risk of eating disorder, and sport nutrition knowledge in young athletes. Nutrients 2023; 15(6):1502.
34. Birkenhead KL & Slater G. A Review of Factors Influencing Athletes' Food Choices. Sports Medicine 2015; 45(11):1511-1522. https://doi.org/10.1007/s40279-015-0372-1.
35. Gençoğlu C, Demir SN & Demircan F. Sporda Beslenme Ve Ergojenik Destek Ürünleri: Bir Geleneksel Derleme. Beden Eğitimi Ve Spor Bilimleri Dergisi 2021; 23(4):56-99.
36. Güneş Z. Spor ve Beslenme: Antrenör ve Sporcu El Kitabı. Nobel Akademik Yayıncılık. Ankara: Çankaya. 2023.
37. Peeling P, Binnie MJ, Goods PS, Sim M & Burke LM. Evidence-based supplements for the enhancement of athletic performance. International journal of sport nutrition and exercise metabolism 2018; 28(2):178-187.
38. Hamilton KP, Ziegler J, Samavat H, Wardenaar F, Esopenko C, Womack J, Krystofiak J & Byham-Gray L. Nutritional Supplement Use and Athletic Characteristics among a Sample of NCAA Division I and Division III Student-Athletes. Journal of Dietary Supplements 2023; 20(6):911-925. https://doi.org/10.1080/19390211.2022.2140740.
39. Roy KA, El Khoury D, Dwyer JJM & Mountjoy M. Dietary Supplementation Practices among Varsity Athletes at a Canadian University. Journal of Dietary Supplements 2021; 18(6):614-629. https://doi.org/10.1080/19390211.2020.1826618.

40. Ekramzadeh M & Taherinasab S. The prevalence of sport dietary supplements consumption among male athlete students in Shiraz University of Medical Sciences, Shiraz, Iran. International Journal of Nutrition Sciences 2017; 2(4):218-223.
41. Vinnikov D, Romanova Z, Dushpanova A, Absatarova K & Utepbergenova Z. Prevalence of supplement use in recreationally active Kazakhstan university students. Journal of the International Society of Sports Nutrition 2018; 15(1):16. https://doi.org/10.1186/s12970-018-0220-4.
42. Nichols QZ, Ramadoss R, Stanzione JR & Volpe SL. Micronutrient supplement intakes among collegiate and masters athletes: A cross-sectional study. Frontiers in Sports and Active Living 2023; 5:854442.