

# Evaluation of the Knowledge, Attitudes, and Behaviors of the Students Studying In the Coaching Education Department Regarding the Utilization of Nutritional Ergogenic Supplement

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## ABSTRACT

**Aim:** The purpose of this study is to ascertain the knowledge, attitudes, and behaviors of students studying in the Coaching Education Department of the Faculty of Sport Sciences regarding the utilization of nutritional ergogenic supplements.

**Methods:** 61.5% of the participants were male (n=264), 38.5% (n=166) were female. Data were collected by conducting an online questionnaire. 19.5 % of students reported using ergogenic nutritional supplement products. The students received an average score of 3.1±0.7 on the benefit sub-dimension of the attitude scale toward nutritional ergogenic supplement products, 2.7±0.6 on the side effects and ethical sub-dimension, and 2.9±0.7 on the natural nutrition sub-dimension.

**Results:** A significant difference has been detected in the mean scores of students on the benefit sub-dimension depending on their gender, sports branch, and use of nutritional supplement products, on the side effects and ethical sub-dimension depending on their gender, class, and use of nutritional supplement products, and on the natural nutrition sub-dimension depending on their gender and use of nutritional supplement products (p<0.05).

**Conclusion:** Students gave the expected answer to most of the questions regarding the use of nutritional ergogenic supplements. Observing the beneficial effect of taking the sports nutrition course on the responses, reveals the importance of education once again.

**Keywords:** Coach, Nutrition, Nutritional Ergogenic Support, Ergogenic Aid.

## INTRODUCTION

The primary objective of the coaching training department is to train coaches who possess a sufficient level of competence in the field of sports. Its mission is to ensure that scientifically based sporting activities are carried out by large masses and training of elite athletes (European, world, and Olympic champions). In this chapter that is based on training (movement) education, educational activities are carried out within the framework of scientific studies (anatomy, physiology, nutrition, biomechanics, physics, psychology, sociology, management, statistics, etc.). Students become coaches after receiving intensive training in the field they specialize in. Coaches convey to athletes the knowledge they have gained throughout their studies and sporting careers. According to scientific studies, the closest source of information for athletes is their coaches<sup>1,2,3</sup>. Coaches are the people who brief athletes with training, technique, tactics, nutrition, and nutritional ergogenic supplement. In this regard, it is critical for coaches to have adequate and accurate knowledge to guide their athletes effectively.

Nutritional ergogenic supplement products are defined as products sold in the form of tablets, capsules, gels, powders, or liquids that contain nutritional vitamins, minerals, amino acids, or proteins that supplement normal nutrition and have physiological effects<sup>2</sup>. Ergogenic nutritional supplement products are commonly used by amateur and professional athletes in many Olympic and non-Olympic sports branches. Studies conducted on nutritional supplement usage revealed that they are used by elite athletes at a rate of 48–99%<sup>4,5</sup>, while by

recreational athletes at a rate of 36–85 percent<sup>6,7,8,9</sup>. The rate of usage has been determined to be higher in men than in women<sup>10</sup>.

The fact that nutritional ergogenic supplement products are available for everyone to use, along with the users' lack of understanding about the product, may result in their misuse. Unfortunately, many athletes use these products recklessly, on the recommendation of a coach, pharmacist, or friend, without even knowing their effects. Nutritional ergogenic supplement products are considered dietary supplements and are not classified as drugs. The fact that these products can be obtained easily despite their high price, increases the interest in these products<sup>4,11,12</sup>.

In 1996, consumer expenditure on supplements in the United States was \$6.5 billion; in 2002 sports nutrition products accounted for one-third of sales and expenditures climbing to \$18 billion, and to \$25.5 billion in 2008<sup>10,13</sup>.

A negative consequence of the use of nutritional ergogenic supplements is the incorporation of forbidden drugs into the products, the exposure of athletes to these prohibited substances, and athletes being penalized for receiving positive tests from the doping control<sup>14</sup>. Additionally, the athlete may be exposed to the dangers associated with the doping substances he utilizes recklessly. The first report on nutritional supplements containing illegal stimulants that were not disclosed on the label was published in 2002. According to the findings of the report, nutritional supplements contaminated with banned substances have been detected in many different countries<sup>15</sup>.

When selecting these products, failing to consider the athletes' needs and the careless use of these products have a detrimental effect on the athletes' health, performance, and sports life. In this respect, it is critical that coaches, who have a strong influence on athletes, possess an accurate knowledge of health and nutrition.

The purpose of this study is to ascertain the knowledge, attitudes, and behaviors of students studying in the Coaching Education Department of the Faculty of Sport Sciences regarding the utilization of the nutritional ergogenic supplement

## MATERIAL AND METHODS

**Participants:** Four hundred and thirty students studying in the different Coaching Education Department of Sports Sciences Faculties in Turkey and whose mean age, body weight, and height are  $21.6 \pm 3.0$  years,  $68.03 \pm 13.30$  kg,  $173.92 \pm 9.19$  cm, respectively; participated in this study voluntarily. 61.5% of the participants were male ( $n=264$ ), 38.5% ( $n=166$ ) were female.

**Procedure:** This study is a case study that aims to evaluate the knowledge, attitudes, and behaviors of students studying in coaching education programs at different universities regarding nutritional ergogenic supplement products. Ethical approval was obtained for the study by the Clinical Research Ethics Committee of Bolu Abant İzzet Baysal University (Date: 21.01.2020, decision no: 2019/316).

The participants were informed both in the written and verbal form in detail about the study, and their consent was obtained on the condition that their ID information would be protected in accordance with the confidentiality principle. Data were collected by conducting an online questionnaire. The questionnaire consists of three parts, 1) the personal detail of the participants, 2) a 13-question attitude scale towards nutritional ergogenic supplement products and 3) 10 questions evaluating the participants' level of knowledge about nutritional ergogenic supplement products. The attitude scale towards nutritional ergogenic supplements is a five-point Likert-type scale developed by Argan and Köse<sup>11</sup> consisting of three subgroups: benefit, side effects and ethics, and natural nutrition. The answers to the questions are scored on a scale of 1 to 5, with 1 indicating "strongly disagree" and 5 indicating "strongly agree"<sup>11</sup>. Questions for the evaluation of the knowledge level of nutritional ergogenic supplements were prepared by dietitians who are experts in the field of sports nutrition and have already been used in scientific studies before<sup>3,16</sup>. The answers given to the questions are "true, false, and I don't know." The evaluation was carried out in accordance with the anticipated answers to the questions.

**Statistical Analysis:** The statistical data analysis package Statistical Package for the Social Sciences (SPSS) 20.0 was used to analyze the data obtained. The questions regarding the general characteristics of the students participating in the study and their use of ergogenic supplement products have been illustrated with Frequency tables. Anthropometric measurements of the students who participated in the study and descriptive statistics regarding the duration of time spent doing sports (mean, standard deviation, minimum and maximum) have been given. The distribution of the athletes' answers to the proposals in the

scale of attitude towards nutritional ergogenic supplements was illustrated with frequency tables, and descriptive statistics such as mean and standard deviation regarding the scores they received from the proposals are provided. To identify the hypothesis tests to be utilized in the study, the Kolmogorov-Smirnov test was employed to verify the data set's compatibility with the normal distribution, and the data set was detected to have complied with the normal distribution. Accordingly, parametric hypothesis testing was used in the study. When comparing dependent and independent variables, the independent sample t-test was employed when the independent variable contained two categories and Analysis of Variance (ANOVA) when the independent variable contained more than two categories. In determining the association between quantitative variables, on the other hand, Pearson correlation analysis was utilized. The level of significance for statistical testing was determined to be  $p < 0.05$ .

## RESULTS

The study included 430 students, 264 (61.4%) males, and 166 (38.6%) females, with an age average of 21.63.0 years. The average BMI of the students was calculated as  $22.3 \pm 3.1$  kg/m<sup>2</sup>. 20.5% of the students study in the first class, 10.2% in the second class, 45.8% in the third class, and 23.5% in the 4th class. While 26.2% of the students surveyed had an interest in endurance sports, 20.6 in strength-power sports, and 53.2 in team sports, it was determined that they had been engaging in sports on average for  $8.5 \pm 4.0$  years.

The distribution of students according to their usage of nutritional ergogenic supplement products is shown in Table 2. 19.5% of students reported using supplement products. Of the students who use supplement products 61.9 % reported that they use protein, 44.0% BCAA, 32.1% creatine, 26.1% carbohydrate, 26.1% vitamin, and 23.8% mineral. 45.2% of the students reported that they used the supplement products for less than a year, 39.3% for one to three years, and 15.5% for three to five years. 66.7% of the students who use nutritional supplement products stated that they started using these supplement products on the advice of a coach, 15.5% with their own initiative, and 8.3% with the recommendation of friends. 67.8% of the students who participated in the study prefer nutritional supplement products to gain strength, 64.2% to increase performance, and 63.0% to increase muscle mass. After using the nutritional supplement product, 35.5% of students reported an increase in muscle mass, 22.4% reported an increase in performance, and 15.8 percent reported that they felt energetic. However, as adverse effects of the products, 29.6 percent reported experiencing gastrointestinal problems, 25.9 percent reported a deterioration in kidney function, and 18.5 percent reported an increase in heart rate. 52.3% of the students purchased nutritional supplement products from the relevant stores, 33.5% from the internet, and 14.2% from pharmacies (Table 1).

Table 1: Students' Use of Nutritional Ergogenic Support (N=430)

Variable	n (%)
Use of nutritional ergogenic support	
Yes	84(19.5)
No	346(80.5)
Type of nutritional supplement used (n=84)	

Protein	52(61.9)
BCAA	37(44.0)
Creatine	27(32.1)
Carbohydrate	22(26.1)
Vitamin	22(26.1)
Mineral	20(23.8)
Glutamin	6(7.1)
L-carnitine	6(7.1)
Omega-3	4(4.7)
Glucosamine	2(2.3)
Arginine	2(2.3)
Propolis	2(2.3)
Caffeine	1(1.2)
The duration of nutritional supplements usage (and=84)	
Less than 1 year	38(45.2)
1-3 year	33(39.3)
3-5 year	13(15.5)
Those who recommend the products (n=84)	
Doctor	3(3.5)
Nutritionist	5(6.0)
Coach	56(66.7)
Friend	7(8.3)
My own decision	13(15.5)
Intended use of nutritional support product (n=84)	
Improve health	25(29.7)
Increase immunity	16(19.0)
Gain strength and power	57(67.8)
Burn fat	14(16.6)
Increase performance	54(64.2)
Increase muscle mass	53(63.0)
Increase body weight	22(26.1)
Nutritional supplement use benefits (n=76)	
My muscle strength increased	8(10.5)
My weight loss process accelerated	1(1.3)
My performance has increased	17(22.4)
I felt more energetic	12(15.8)
My muscle mass increased	27(35.5)
My recovery accelerated	11(14.5)
Harms of nutritional support product use (n=27)	
Gastrointestinal disturbances	8(29.6)
Acceleration in heartbeat	5(18.5)
Impairment in liver functions	4(14.8)
Renal dysfunction	7(25.9)
Acne	3(11.2)
Place where nutritional support product bought (n=84)	
From related stores	44(52.3)
Pharmacies	12(14.2)
Internet	28(33.5)

Table 2 shows the distribution of answers to the attitude scale regarding nutritional ergogenic supplements

Table 2: The Distribution of Students' Responses to the Scale of Attitudes towards Nutritional Ergogenic Supplements and the Mean Scores of the Sub-Dimensions (N=430)

Attitude Scale Towards Nutritional Ergogenic Supplements	I strongly disagree		I do not agree		I'm undecided		I agree		Absolutely I agree		$\bar{X} \pm sd$
	n	%	n	%	n	%	n	%	n	%	
<b>Benefit</b>											
1. Athlete nutritional supplements are necessary for sports.	30	7.0	63	14.7	133	30.9	163	37.9	41	9.5	3.1±0.7
2. Athlete nutritional supplements increase performance.	23	5.3	41	9.5	100	23.3	214	49.8	52	12.1	
3. Athlete nutritional supplements are used correctly	45	10.5	116	27.0	178	41.4	63	14.7	28	6.5	
4. Every athlete should use nutritional support.	71	16.5	182	42.3	107	24.9	55	12.8	15	3.5	
5. Athlete nutritional supplements should be easily available.	29	6.7	71	16.5	107	24.9	181	42.1	42	9.8	
<b>Side Effects and Ethics</b>											
6. Sports nutritional supplements create a doping effect.	56	13.0	129	30.0	140	32.6	93	21.6	12	2.8	2.7±0.6
7. Sports nutrition supplements have side effects.	13	3.0	44	10.2	183	42.6	154	35.8	36	8.4	
8. The use of nutritional supplements for athletes is illegal.	88	20.5	164	38.1	124	28.8	44	10.2	10	2.3	
9. The use of nutritional supplements for athletes is not moral.	113	26.3	150	34.9	113	26.3	43	10.0	11	2.6	
<b>Natural nutrition</b>											
10. Natural nutrition is sufficient in sports.	32	7.4	78	18.1	106	24.7	156	36.3	58	13.5	2.9±0.7
11. Athlete nutritional supplements are only used in bodybuilding sports.	113	26.3	187	43.5	77	17.9	43	10.0	10	2.3	
12. The same performance can be achieved without the use of nutritional supplements.	31	7.2	88	20.5	135	31.4	134	31.2	42	9.8	
13. Athlete nutritional supplements cause psychological addiction.	33	7.7	98	22.8	134	31.2	121	28.1	44	10.2	

provided by the students who participated in the study and the descriptive statistics on the averages of the scores they received from the sub-dimensions. The mean score received by students from the sub-dimension of benefit on the attitude scale toward nutritional ergogenic supplement products is 3.1±0.7, 2.7±0.6 from the sub-dimension of side effects and ethics, and 2.9±0.7 from the sub-dimension of natural nutrition. The rate of respondents who agreed with the statements "Athlete nutritional supplements are necessary for sports" and "Athlete nutritional supplements improve performance" was higher on the benefit sub-dimension of the scale (37.9%, 49.8%, respectively). The rate of those who answered "I disagree" to the statements "The use of nutritional supplements by athletes is not legal" and "The use of nutritional supplements by athletes is unethical" was found to be high in the sub-dimension of side effects and ethics (38.1%, 34.9%, respectively). The rate of those who answered, "I agree" with the statement "Natural nutrition is sufficient in sports" and those who answered, " I don't agree" with the statement "Athlete nutritional supplements are employed only in bodybuilding sports" is higher in the sub-dimension of natural nutrition. Those who answered "I am undecided" to the statements "The same performance can be attained without the use of athletic nutritional supplements" and "Athletic nutritional supplements are psychologically addictive" were in the majority (Table 2).

The comparison of the attitude scale scores regarding nutritional ergogenic supplement products of the surveyed students depending on gender, class, sports branch, use of nutritional supplements, and duration of use of nutritional supplement products is presented in Table 4. A significant difference has been detected in the mean scores of students on the benefit sub-dimension depending on their gender, sports branch, and use of nutritional supplement products, on the side effects and ethical sub-dimension depending on their gender, class, and use of nutritional supplement products, and on the natural nutrition sub-dimension depending on their gender and use of nutritional supplement products (p<0.05) (Table 3).

Table 3: Comparison of Students' Attitude Scale Scores Towards Nutritional Ergogenic Supplements According to Gender, Class, Sports Branch, Use of Nutritional Supplements and Duration

Sub Dimensions	Gender		Class level				Sports Branches			Using a nutritional supplement		The duration of nutritional supplements usage (year)		
	Man	Women	1.	2.	3.	4.	Endurance Team	Strength-power		Yes	No	<1	1-3	3-5
Benefit	3.2±0.7	2.9±0.7	3.2±0.5	3.0±0.7	3.1±0.7	3.0±0.9	3.1±0.6	2.8±0.8	3.0±0.7	3.4±0.7	2.9±0.7	3.4±0.7	3.6±0.6	3.2±0.8
	T=2.845 p=0.005*		F=2.180 p=0.090				F=4.610 p=0.010**			T=5.736 p=0.000*		F=1.959 p=0.148		
Side Effects and Ethics	2.5±0.7	2.7±0.6	2.5±0.6	2.7±0.4	2.6±0.7	2.8±0.7	2.6±0.7	2.8±0.7	2.6±0.8	2.2±0.6	2.7±0.6	2.3±0.7	2.1±0.6	2.2±0.6
	T=-3.003 p=0.003*		F=2.943 p=0.033**				F=2.808 p=0.061			T=-7.124 p=0.000*		F=1.478 p=0.234		
Natural nutrition	2.8±0.6	3.1±0.7	3.0±0.7	3.0±0.8	2.9±0.7	3.0±0.8	2.9±0.7	3.0±0.7	2.9±0.7	2.4±0.6	3.1±0.7	2.4±0.7	2.3±0.6	2.6±0.4
	T=-3.144 p=0.002*		F=1.022 p=0.383				F=1.408 p=0.078			T=-7.899 p=0.000*		F=1.694 p=0.190		

\*Independent Sample T test, \*\*One-Way Anova test

Table 4: Distribution of Students' Knowledge Levels about Nutritional Ergogenic Supplements

Variables		n (%)	Gender			p	Class level				p
			Man n (%)	Women n (%)			1. n (%)	2. n (%)	3. n (%)	4. n (%)	
The use of additional vitamins and minerals is absolutely necessary.	True	233(54.2)	144(61.8)	89(38.2)	0.982	39(16.7)	31(13.7)	101(43.3)	62(26.6)	0.001*	
	False	77(17.9)	47(61.0)	30(39.0)		11(14.3)	6(7.7)	47(61.0)	15(17)		
	I do not know	120(27.9)	73(60.8)	47(39.2)		38(31.7)	10(8.3)	48(40.0)	24 (20.0)		
Vitamins give energy to the body.	True	283(65.8)	162(57.2)	121(42.8)	0.001*	66(23.3)	30(10.6)	112(39.6)	75(26.5)	0.006*	
	False	93(21.6)	57(61.3)	36(38.7)		9(9.7)	10(10.8)	57(61.3)	17(18.3)		
	I do not know	54(12.6)	45(83.3)	9(16.7)		13(24.1)	6(11.1)	27(48.1)	9(16.7)		
Antioxidants have no effect on the immune system.	True	26(6.0)	20(76.9)	6(23.1)	0.020*	6(23.0)	6(23.0)	14(34.8)	5(19.2)	0.001*	
	False	177(41.2)	96(54.2)	81(45.8)		21(11.9)	21(11.9)	85(48.0)	50(28.2)		
	I do not know	227(52.8)	148(65.2)	79(34.8)		65(28.6)	20(8.8)	96(42.3)	46(20.3)		
All herbal products are harmless.	True	40(9.3)	23(57.5)	17(42.5)	0.418	6(15.0)	7(17.5)	16(40.0)	11(7.5)	0.357	
	False	318(74.0)	192(60.4)	126(39.6)		62(19.5)	30(9.4)	153(48.1)	73(23.0)		
	I do not know	72(16.7)	49(68.1)	23(31.9)		20(27.8)	7(9.7)	28(38.9)	17(23.6)		
Anyone can use multivitamins/minerals	True	135(31.4)	82(60.7)	53(39.3)	0.905	20(14.8)	17(12.6)	62(45.9)	36(26.7)	0.318	
	False	187(43.5)	117(62.6)	70(37.4)		39(20.9)	16(8.6)	90(48.1)	42(22.5)		
	I do not know	108(25.1)	65(60.2)	43(39.8)		29(26.9)	11(10.2)	45(41.7)	23(21.3)		
It is not necessary to consult a physician to use nutritional support products.	True	50(11.6)	33(66.0)	17(34.0)	0.677	14(28.0)	6(12.0)	22(40.0)	10(20.0)	0.538	
	False	314(73.0)	189(60.2)	125(39.8)		58(18.5)	32(10.2)	147(46.8)	77(24.5)		
	I do not know	66(15.3)	42(63.6)	24(36.4)		16(24.2)	9(13.6)	27(40.9)	14(21.2)		
When using nutritional support products, the dose is not important to us.	True	21(4.9)	14(66.7)	7(33.3)	0.452	6(23.0)	5(19.2)	10(38.6)	5(19.2)	0.850	
	False	384(89.3)	232(60.4)	152(39.6)		77(20.4)	34(9.0)	176(47.4)	90(23.8)		
	I do not know	25(5.8)	18(72.0)	7(28.0)		5(18.5)	5(18.5)	11(40.8)	6(22.2)		
Vitamins and minerals taken in excess of the requirement will not do any harm.	True	10(2.3)	5(50)	5(50)	0.005*	5(25)	5(25)	5(25)	5(25)	0.650	
	False	370(86.0)	216(58.4)	154(41.6)		76(21.7)	31(8.8)	161(46.0)	82(23.5)		
	I do not know	50(11.6)	39(78.0)	11(22.0)		6(12.0)	7(14.0)	26(52.0)	11(22.0)		
In order to increase muscle mass, protein supplements should be used more than the requirement.	True	69(16.0)	47(68.1)	22(31.9)	0.456	8(11.6)	7(10.1)	38(55.1)	16(23.2)	0.165	
	False	294(68.4)	177(60.2)	117(39.8)		60(20.4)	33(11.2)	133(45.2)	68(23.1)		
	I do not know	67(15.6)	40(59.7)	27(40.3)		20(29.9)	6(8.9)	25(37.3)	17(23.9)		

\*Pearson ki chi-square test

Table 4 illustrates the distribution of students' knowledge about nutritional ergogenic supplements by gender and class level. A statistically significant difference has been determined depending on genders in responses to the questions "Vitamins provide energy for the body," "Antioxidants have no influence on the immune system," and "Excessive use of vitamins and minerals are not detrimental" (p<0.05). A statistically significant difference has been determined depending on the students' class levels in the responses to the questions "Additional vitamin

and mineral use is absolutely necessary," "Vitamins provide energy for the body," and "Antioxidants have no effect on the immune system" (p<0.05) (Table 4)

## DISCUSSION

The use of nutritional ergogenic supplements is becoming increasingly prevalent among athletes and sportspeople each passing day, and numerous sports supplement products are being introduced to improve health and performance<sup>11,17</sup>.

This study, which was conducted to evaluate the knowledge, attitudes, and behaviors of students who received sports science education and would graduate as coaches on the use of the nutritional ergogenic supplements, determined that 19.5% of the students used the product. Of the students using supplements, 61.9% reported using protein, 44.0% BCAA, 32.1% creatine, 26.1% carbohydrate, 26.1% vitamin and 23.8% mineral (Table 2). In another study, it was determined that 55.7% (n=186) of the participants (n=334) used nutritional supplement products<sup>3</sup>. According to Cetin et al.<sup>1</sup> it was concluded that 14.7% of the athletes (n=300) used ergogenic supplements to increase their performance. In the conclusion of most studies, protein and amino acid supplements took place on the top among the most frequently used supplements<sup>7,12,18,19</sup>.

In terms of duration of usage, 45.2 % of the students reported using ergogenic supplement products for less than a year, 39.3 % using them for one to three years, and 15.5% reported using them for three to five years. In a study they conducted on 405 people, Goston & Correia<sup>8</sup> determined that 62.5% of the participants used nutritional ergogenic supplements for at least one year and 19.4% for more than two years. According to Lacerda et al.<sup>12</sup>, most of the participants used the supplements for more than one year.

66.7% of the students who use nutritional supplement products stated that they started using these supplement products on the advice of a coach, 15.5% with their own initiative, and 8.3% with the recommendation of friends (Table 1). Many studies concluded that the advice of coaches is very efficient in this regard. Şenel et al.<sup>20</sup> revealed that athletes obtained information about these products through coaches (42.5%), media (25.8%), and friends (25%). Argan & Köse,<sup>11</sup> and Hasbay and Ersoy,<sup>21</sup> discovered that ergogenic aids were particularly suggested by conditioners (75.5%) and coaches (75.5%) in their study evaluating the use of nutritional ergogenic supplement status of elite athletes from various sports branches (51%). In their study conducted to determine the knowledge and habits of physical education and sports school students, Cetin et al.<sup>1</sup> determined that 56.8 % of the students obtained information about ergogenic aids, doping, and health from their coaches. The results of many other studies also support that the coaches are the primary source of information<sup>22,23</sup>.

67.8% of the students who participated in the study prefer nutritional supplement products to gain strength, 64.2% to increase performance, and 63.0% to increase muscle mass (Table 1). In their study (n=405), Causevic et al.<sup>7</sup> identified the top three reasons in participants' aims to use ergogenic supplements as building muscle (59.7%), strengthening immunity (28.6%), and reducing body fat (11.6%). While in another study, improving sports performance and reducing fat ranked first, improving health ranked third. Ercen,<sup>18</sup>; Hasbay and Ersoy,<sup>21</sup> revealed that athletes use products for various reasons, such as providing energy (45.8%), improving performance (29.2%), and muscle mass growth (18.2%). The majority of studies have established that the primary objective of using ergogenic aids is to improve performance<sup>19,24,25</sup>.

After using the nutritional supplement product, 35.5% of students reported an increase in muscle mass, 22.4% reported an improvement in performance, and 15.8% percent reported that they felt energetic. However, as adverse effects of the products, 29.6% percent reported experiencing gastrointestinal problems, 25.9% percent reported a deterioration in kidney function, and 18.5 percent reported an increase in heart rate (Table 1). In their study, Çetin et al.<sup>1</sup> determined that 95.4% of athletes were affected positively following the usage of ergogenic supplements, while 4.5% were affected negatively. According to Hasbay and Ersoy's<sup>21</sup> study, 57.5 % of athletes reported benefiting from the products, whereas 5.4% reported that they were harmful. 100% of those who benefited from the products responded as "It has improved my performance," and 100% of those who were harmed responded as "It fattened me." Guston et al.<sup>8</sup> revealed that those who reported experiencing side effects mostly experienced dizziness, insomnia, or adverse effects on the skin, liver, or kidneys. Yarar et al.<sup>3</sup> determined in their study that 57.5% (n=192) of the athletes stated that it was beneficial, 37.1% (n=124) had no positive effect, and 5.4% (n=18) stated that it was harmful. 55.7% (n=186) of those who believed it was beneficial experienced an increase in their performance, and 5.4% (n=18) of those who believed it was harmful experienced an increase in body weight.

The mean score of the students they received from the benefit sub-dimension of the attitude scale towards nutritional ergogenic supplements is  $3.1 \pm 0.7$ . On the benefit sub-dimension of the scale, the rate of those who answered "I agree" to the statements "Athlete nutritional supplements are necessary for sports," "Athlete nutritional supplements improve performance," and "Athlete nutritional supplements should be easily accessible" is higher. The rate of those who answered "I disagree" to the statement "Every athlete should use nutritional supplement" is higher (Table 2). While most participants in Ercen's<sup>18</sup> study supported the opinion that "athlete nutritional supplements are necessary for athletes," they were indecisive in other questions on the sub-dimensions of benefit.

The mean score of the students they received from the sub-dimension of side effects and ethics in the attitude scale regarding nutritional ergogenic supplements is  $2.7 \pm 0.6$ .

The rate of those who answered "I disagree" to the statements "The use of nutritional supplements by athletes is not legal" and "The use of nutritional supplements by athletes is unethical" was found to be high in the sub-dimension of side effects and ethics (38.1%, 34.9%, respectively). On the other hand, the respondents who answered "I am undecided" to the statements "Athlete nutritional supplements cause doping effect" and "Athlete nutritional supplements have side effects" were in the majority. Ercen<sup>18</sup> determined that athletes generally responded "I disagree" to the propositions in this sub-dimension, with the statement "The use of nutritional supplements by athletes is not ethical or legal" being the least agreed upon, and the statement "Athlete supplements have side effects" being the most agreed upon. The fact that both studies had a high rate of respondents who answered "I disagree" to the view that nutritional supplement use is not ethical or legal indicated that they

had similar outcomes in terms of believing they are legal and ethical.

The mean score of the students they received from the natural nutrition sub-dimension in the attitude scale regarding nutritional ergogenic supplements is  $2.9 \pm 0.7$ . On the other hand, the rate of those who agreed with the statement "Natural nutrition is sufficient in sports" and those who disagreed with the sentence "Athlete nutritional supplements are used only in bodybuilding sports" is higher in the sub-dimension of natural nutrition. Those who were indecisive about the statements "The same performance can be achieved without the use of nutritional supplements for athletes" and "Nutritional supplements for athletes cause psychological addiction" are in the majority (Table 2). In his study, Ercen<sup>18</sup> revealed that among the propositions in this sub-dimension, the least adopted by athletes was "Athlete nutritional supplements are used exclusively in bodybuilding sports," while the most widely adopted proposition was "Natural nutrition in sports is sufficient." The answers given in both studies are similar.

A significant difference has been detected in the mean scores of students on the benefit sub-dimension depending on their gender, sports branch, and use of nutritional supplement products, on the side effects and ethical sub-dimension depending on their gender, class, and use of nutritional supplement products, and on the natural nutrition sub-dimension depending on their gender and use of nutritional supplement products (Table 3,  $p < 0.05$ ). Men, endurance athletes, and those who use nutritional ergogenic supplement products had higher scores on the benefit sub-dimension. Side effects and ethical sub-dimension scores are higher in women, fourth-class students, and those who do not use nutritional ergogenic supplement products. The mean score of the natural nutrition sub-dimension, on the other hand, was determined to be higher in women and those who did not use nutritional ergogenic supplement products. While the statements in the Benefit sub-dimension were defined as negative behavioral attitudes by the researchers who developed the scale, it was stated that the statements in the Side Effect and Ethics sub-dimension and the Natural Nutrition sub-dimensions represent positive behavioral attitudes<sup>11,18</sup>. In light of this information, when the athletes' scores from the sub-dimensions of the attitude scale regarding nutritional ergogenic supplements are sorted from high to low, it has been observed that the benefit sub-dimension received the highest score ( $3.1 \pm 0.7$ ), while the side effects and ethics sub-dimension received the lowest score ( $2.7 \pm 0.6$ ). When the results of the attitude scale are examined, although most of the study group believes that sports nutrition supplements are necessary for sports, the majority of the group has the opinion that these products are not used correctly. According to the study that Ercen<sup>18</sup> conducted, when athletes' scores on the Attitude Scale regarding Nutritional Ergogenic Supplements sub-dimensions were sorted from high to low, it was observed that the Benefit sub-dimension received the highest score ( $3.33 \pm 0.91$ ), while the Side Effects and Ethics sub-dimension received the lowest score ( $2.45 \pm 0.89$ ). The results of the study are similar in this respect.

When the distribution of students' knowledge about nutritional ergogenic supplements was examined by gender

and class level, a statistically significant difference in the responses to the questions "Vitamins provide energy to the body," "Antioxidants have no effect on the immune system," and "Excessive use of vitamins and minerals is not harmful" was determined. ( $p < 0.05$ ). In the answers given by gender, those who believe that vitamins provide energy to the body, that antioxidants have an effect on immunity, and that taking excessive vitamins and minerals are harmful are in the majority.

A statistically significant difference has been determined depending on the students' class levels in the responses to the questions "Additional vitamin and mineral use is absolutely necessary," "Vitamins provide energy for the body," and "Antioxidants have no effect on the immune system" ( $p < 0.05$ ). According to the distribution by class level, the rate of those who believe that the use of additional vitamins and minerals is necessary, that vitamins provide energy to the body, and that antioxidants have an effect on the immune system is higher, especially in the third-class students. Vitamins are nutrients that do not provide energy to the body but participate in the energy formation mechanism<sup>26</sup>. Most of the students were mistaken about this question and stated that it would provide energy. However, the remaining questions were answered expectedly. Yarar et al.<sup>3</sup> and Unsal et al.<sup>16</sup> revealed that the majority of participants stated that "vitamins provide energy" in their studies. Given that the majority of the sports nutrition course is taught in the third class, it has been determined that the rate of third-class students providing the desired responses is higher.

## CONCLUSION

This study, which was conducted to evaluate the knowledge, attitudes, and behaviors of students who received sports science education and would graduate as coaches on the use of the nutritional ergogenic supplements, determined that 19.5% of the students used the product, and the protein supplements were the most preferred. Coaches (66.7%) are the first people to be consulted on product use (%66.7). 67.8% of the students prefer nutritional supplement products to gain strength, 64.2% to improve performance, and 63.0% to increase muscle mass. After using the nutritional supplement product, 35.5% of students reported an increase in muscle mass, 22.4% reported an improvement in performance, and 15.8% reported that they felt energetic. However, as adverse effects of the products, 29.6% reported experiencing gastrointestinal problems, 25.9% reported a deterioration in kidney function, and 18.5% reported an increase in heart rate. When the students' scores from the sub-dimensions of the attitude scale regarding nutritional ergogenic supplement products were sorted from high to low, it was observed that the benefit sub-dimension received the highest score ( $3.1 \pm 0.7$ ), and the side effects and ethics sub-dimension received the lowest score ( $2.7 \pm 0.6$ ). When the results of the attitude scale are examined, although most of the study group believes that sports nutrition supplements are necessary for sports, the majority is of the opinion that these products are not used properly. All other questions regarding the use of nutritional ergogenic supplements received expected responses, with the exception of "additional use of vitamins and minerals is

absolutely necessary" and "vitamins provide energy to the body." It is a prevailing view that a physician should be consulted before using the products and that they should not be used more than necessary. The beneficial influence of students taking a sports nutrition course on the answers to the questions reveals the importance of education.

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