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Evaluation of University Students' Knowledge Levels on Dietary Supplements: A Case Study from Konya Province

Meryem AYRANCI PINARCIK* **İlknur HACIOĞLU** **Sümeyye SEİS**

Necmettin Erbakan University, Nezahat Keleşoğlu Faculty of Health Sciences, Department of Nutrition and Dietetics, Konya, Türkiye

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ABSTRACT

Dietary supplements are products used to supplement individuals' nutrition and prevent nutritional deficiencies, and the importance of their correct and informed use is increasing. Understanding the purpose, method, and frequency of use of these products, which are becoming increasingly popular among young adults and university students, is essential to ensure their safe and effective use. This study aimed to assess university students' knowledge level regarding dietary supplements. This cross-sectional study was conducted with students enrolled in different departments at five different universities in Konya province in the 2023-2024 academic year. Research data were collected via an online survey using the snowball sampling method and obtained from 272 participants. A significance level of $p < 0.05$ was accepted in all analyses. Fifty-eight point one percent of participants used dietary supplements, with the most common purpose being to support adequate and balanced nutrition and prevent iron deficiency. Dietary supplements are generally consumed in tablet form, and their use mostly occurs based on a doctor's recommendation. Participants who did not use supplements mostly stated that they did not need them or that they obtained the nutrients from their diet. Frequency of use and types of supplements varied; multivitamins and vitamin D were used "every day," while biotin and calcium were mostly preferred "once a week." Participants' knowledge level regarding nutritional supplements was limited, with a particular lack of information observed regarding proper use, content information, and side effects. In conclusion, university students' knowledge level regarding nutritional supplements was found to be limited. The findings emphasize the importance of integrating dietary supplement awareness into daily life. Evidence-based information should be provided to the public for safe and informed use, and targeted education programs should be planned. Furthermore, using these products only upon the recommendation of healthcare professionals will reduce potential health risks.

Üniversite Öğrencilerinin Besin Destekleri Hakkındaki Bilgi Düzeylerinin Değerlendirilmesi: Konya İli Örneği

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ÖZET

Besin destekleri, bireylerin beslenmesini tamamlamak ve besin eksikliklerini önlemek amacıyla kullanılan ürünler olup, doğru ve bilinçli kullanımının önemi giderek artmaktadır. Özellikle genç yetişkinler ve üniversite öğrencileri arasında kullanımı yaygınlaşan bu ürünlerin hangi amaçla, ne şekilde ve ne sıklıkta kullanıldığını anlamak, güvenli ve etkili kullanımın sağlanması açısından gereklidir. Bu çalışmada üniversite öğrencilerinin besin destekleri konusundaki bilgi düzeylerinin değerlendirilmesi amaçlanmıştır. Kesitsel olarak yürütülen bu çalışma, 2023-2024 eğitim-öğretim yılında Konya ilinde bulunan beş ayrı üniversitedeki farklı bölümlerde öğrenim gören öğrenciler ile yürütülmüştür. Araştırma verileri, çevrim içi anket aracılığıyla kartopu örneklem yöntemiyle toplanmış ve 272 katılımcıdan elde edilmiştir. Tüm analizlerde anlamlılık düzeyi $p < 0,05$ olarak kabul edilmiştir. Katılımcıların %58,1'i besin desteği kullanmakta olup, en yaygın kullanım amacı yeterli ve dengeli beslenmeyi desteklemek ve demir eksikliğini önlemektir. Besin destekleri genellikle tablet formunda tüketilmekte ve kullanım çoğunlukla doktor önerisiyle gerçekleşmektedir. Kullanım göstermeyen katılımcılar, çoğunlukla besin desteğine ihtiyaç duymadıklarını veya besin ögelerini diyetle karşıladıklarını belirtmiştir. Kullanım sıklığı ve destek türleri değişiklik göstermekte olup, multivitamin ve D vitamini "her gün" kullanılırken; biotin ve kalsiyum çoğunlukla "haftada bir" tercih edilmektedir. Katılımcıların besin destekleri konusundaki bilgi düzeyleri sınırlı olup, özellikle doğru kullanım, içerik bilgisi ve yan etkiler hakkında bilgi eksikliği olduğu gözlenmiştir. Sonuç olarak üniversite öğrencilerinin besin destekleri konusundaki bilgi düzeyi sınırlı bulunmuştur. Elde edilen bulgular doğrultusunda, besin desteği kullanımına ilişkin farkındalığın günlük yaşama entegre edilmesi büyük önem taşımaktadır. Bu ürünlerin güvenli, kontrollü ve akılcı bir biçimde kullanılabilmesi için faydaları, riskleri, potansiyel yan etkileri ve ilaç-besin etkileşimleri hakkında toplumun doğru ve kanıta dayalı bilgiye erişimi sağlanmalıdır. Bu doğrultuda, güvenilir ve hedefe yönelik eğitim stratejilerinin geliştirilmesi gerekmektedir. Besin desteklerinin yalnızca alanında uzman sağlık profesyonellerinin önerisi doğrultusunda kullanılması, olası sağlık risklerinin önlenmesi açısından önem arz etmektedir.

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***Sorumlu Yazar:** Meryem Ayrancı Pınarcık, *dyt.meryem@gmail.com*

INTRODUCTION

Adequate and balanced nutrition plays an important role in maintaining health and preventing chronic diseases (Singh et al., 2024). Malnutrition is considered one of the main risk factors for the development of most noncommunicable diseases (Budreviciute et al., 2020). Today, due to reasons such as the growing population, intense work pace, economic factors, climate change, etc., there have been changes in individuals' diets and imbalances in their food consumption. As a result, deficiencies in certain nutrients may occur. Nutritional supplements are needed to eliminate these deficiencies (Kanak et al., 2021).

Dietary supplements are used to support an individual's nutrition and improve overall health by preventing and treating nutritional deficiencies (Thomas et al., 2016). However, they should not replace the various nutrients necessary for a healthy diet (Valavanidis, 2016). According to the US Food and Drug Administration (FDA), dietary supplements are defined as products containing one or more dietary components, including vitamins, minerals, amino acids, herbs, botanicals, other substances, or their constituents (FDA, 2024). Food supplements are defined by the European Food Safety Authority (EFSA) as concentrated sources of nutrients or substances with a nutritional or physiological effect, such as vitamins, minerals, or similar substances, and are sold in specific doses in tablet, capsule, pill, or liquid form (Elsahoryi et al., 2023).

Dietary supplements contain a single nutrient or a combination of nutrients, including multivitamins such as vitamins C, E, B6, B12, and A, magnesium, and zinc, as well as herbal products, amino acids, and minerals (Shahwan & Al Abdin, 2018). Another definition describes these as products containing nutrients such as minerals, vitamins, carbohydrates, proteins, fiber, amino acids, and fatty acids, or other plant-based, bioactive substances and similar substances with physiological effects or nutritional value, either alone or in combination, in the form of concentrated or extracted powders, tablets, capsules, lozenges, droppers, liquid ampoules, and bottles, which can be consumed in specific doses (Doğan et al., 2020). Dietary supplements are also referred to as nutraceuticals, dietary supplements, fortified foods, or food supplements. Nutritional supplements are designed for oral consumption and serve as complementary sources of essential nutrients (Alshehri et al., 2025). These supplements contribute to an individual's nutrition, but it is not possible to ensure adequate and balanced nutrition by using only dietary supplements. Legal regulations regarding dietary supplements in Türkiye have been prepared in parallel with European Parliament and Council Directive 2002/46/EC (T.C. Sağlık Bakanlığı, 2022). Accordingly, the “Turkish Food Codex Notification on Food Supplements” (Notification No: 2013/49) was created (Anonymus, 2013). It has been in force since 2013, and three more notifications regarding changes to certain articles of this notification were published in 2015 (Notification No: 2015/44) (Anonymus,2015) and 2017 (Notification No: 2017/6 and 2017/27) (Anonymus, 2017a, Anonymus, 2017b).

The reasons for using dietary supplements may vary from person to person. Individuals generally choose these products to maintain their health, ensure adequate nutrition, improve their appearance, or control their weight (Alowais & Selim, 2019). For example, vitamin C is commonly used to strengthen the immune system, while vitamin D and calcium are preferred, especially by older individuals, to support bone health (Bailey et al., 2013). Pregnant women, athletes, and groups with specific nutritional needs can also particularly benefit from dietary supplements (Alshehri et al., 2025; Xiang et al., 2022). In addition, inadequate intake of nutrients can cause severe health problems such as chronic metabolic diseases, marasmus, and kwashiorkor (Kiani et al., 2022). While dietary supplements offer benefits, excessive use can also cause various adverse effects. Some nutritional supplements have been associated with liver and kidney damage, immune system suppression, birth defects, and digestive problems (Supplements; Wooltorton, 2003). Furthermore, nutritional supplements can interact with certain

medications, reducing their effectiveness (AlTamimi, 2019).

Increased health awareness and easy access to education and nutritional support have also boosted the global consumption of these products (Alshehri et al., 2025; Kourkouta et al., 2016). The Middle East (Islam et al., 2021; Naqvi et al., 2018), Asia (Naqvi et al., 2019), Canada (El Khoury et al., 2020) and some regions of Europe (Žeželj et al., 2018) have shown an increase in the use of nutritional supplements among adult students. According to the 2017 Turkish Nutrition and Health Survey (TNHS) data, 9.7% of individuals aged 19-64 use at least one dietary supplement. This rate is 5.8% among men and 13.6% among women. It has been determined that individuals in Türkiye use vitamin and mineral supplements the most (T.C. Sağlık Bakanlığı, 2022). There is a lack of legislation regarding these products, and a common scientific consensus on the safety and efficacy of most dietary supplements has not yet been established. Furthermore, evidence regarding the effects of dietary supplement use on health remains controversial (Bailey, 2020; Bailey et al., 2013; Chinnakali et al., 2014; Martínez et al., 2012).

Young adults are more susceptible to the effects of malnutrition, such as nutrient deficiencies (Al-Naggar & Chen, 2011; Stanojević-Ristić et al., 2017). University students, in particular, may differ from the general population in their use of nutritional supplements due to differences in their lifestyles (Woo et al., 2012). They may use these products for various purposes. In this context, the increasing use of dietary supplements has made it important to understand the public's knowledge, attitudes, and behaviors toward these products and to promote their safe and informed use. However, information on the purpose, manner, and frequency of use of these supplements is limited. Therefore, this study aimed to evaluate university students' knowledge levels regarding dietary supplements.

MATERIAL METHOD

This cross-sectional study was conducted with students enrolled in different departments at five different universities in Konya province. The research was conducted between December and March of the 2023-2024 academic year with individuals who met the specified participation criteria and voluntarily agreed to participate in the study. The research data was obtained by distributing an online survey created using Google Forms to participants using the snowball sampling method.

Study Design and Sample Size

The research universe consisted of 137,620 students enrolled in universities in Konya province during the 2023-2024 academic year. The sample size was calculated using the Raosoft sample size calculation program. Accordingly, with a population of 137,620, prevalence = 50%, and a margin of error of 5%, the target sample size was 384 participants with a 95% confidence interval. During the data collection process, 272 participants were reached, and post-hoc power analysis results showed that the current sample was sufficient for the purposes of the study. The inclusion criteria for the study were defined as: studying at universities in Konya province, being 18 years of age or older, and being able to use information technology devices and networks such as the internet, computers, and telephones. The exclusion criteria for the study were defined as: being under 18 years of age, studying at universities outside Konya province, and not knowing how to use information technology devices and networks such as the internet, computers, and telephones.

Data Collection

The questionnaire form, prepared as a data collection tool, collects students' sociodemographic information (age, gender, height, body weight, university attended, smoking and alcohol use status, presence of chronic diseases) and dietary supplement use status (whether they use dietary supplements, if not, the reasons why, the form of dietary supplements used, who/where they received

recommendations about nutritional supplement use, which nutritional supplements they take and how often). The final section contains questions aimed at determining participants' knowledge level regarding dietary supplements. The final section contains questions designed to assess participants' knowledge levels regarding nutritional supplements. These questions are not a scale, but rather a total of 14 questions created by the researchers themselves based on a review of the relevant literature on individuals' use of nutritional supplements and their level of knowledge (Alhomoud et al., 2016, Axon et al., 2017, Žeželj et al., 2018, Tunçer et al., 2020). Responses to questions regarding knowledge level were scored by the researcher on a range from one to five points, from the option "strongly disagree" to the option "strongly agree." A total score between 14 and 70 points can be obtained from these questions. Higher scores indicate a better level of knowledge. A total score below 2.5, obtained by dividing the total score by the number of questions, indicates an insufficient level of knowledge, while a score above 2.5 indicates a better level of knowledge.

Data Analysis

The collected data were analyzed using IBM SPSS Statistics 27 software. Descriptive statistics were presented by calculating the mean and standard deviation values for continuous variables and the frequency and percentage distributions for categorical variables. The chi-square test or Fisher's exact test was applied to evaluate the differences between groups in categorical variables. A significance level of $p<0.05$ was accepted for all statistical analyses.

RESULTS

Characteristics of Participants

The distribution of participants' basic characteristics is shown in Table 1. A total of 272 university students participated in the study, 81.2% of whom were female and 18.8% male. The mean age was 22.1± 3.81. When examined according to body mass index (BMI), the majority (63.2%) were within the normal BMI range. It was determined that a significant part of the participants did not use cigarette (70.6%) and alcohol (83.5%). In addition, the vast majority (88.2%) did not have any diagnosed illness.

Table 1
Characteristics of the Study Participants (n=272)

Variable	n	%
Gender		
Male	51	18.8
Female	221	81.2
Age (years) ($\bar{X}$±SD)	22.1± 3.81 (Min-Max 17-47)	
BMI (kg/m$^{2)}$		
Underweight	35	12.9
Normal	172	63.2
Overweight	53	19.5
Obese	12	4.4
Cigarette smoking		
Yes	65	23.9
No	192	70.6
Has quit smoking	15	5.5
Alcohol use		
Yes	36	13.2
No	227	83.5
Has quit drinking	9	3.3
Chronic disease		
No	240	88.2
Yes	32	11.8

Participants' Dietary Supplement Use

The distribution of participants' use of dietary supplements is shown in Table 2. According to this, 58.1% use dietary supplements, while 41.9% do not use any dietary supplements. Of these supplements, 20.2% of participants use them for adequate and balanced nutrition, 19.1% to prevent iron deficiency, 10.3% to prevent hair loss, 5.9% for bone health, 3.7% to support exercise, 0.7% to protect against the side effects of medications, while 2.9% stated that they did not know the reason for their use. Dietary supplements are mostly consumed in tablet form (30.5%), followed by liquid (8.5%), capsule (5.9%), and powder (2.6%) forms. Participants stated that they used these supplements most often based on the recommendation of, in order, a doctor (27.6%), pharmacist (7.4%), and dietitian (5.9%).

Those who did not use any dietary supplements mostly stated (57.6%) that they did not need to use them. Of the remainder, 22.2% stated that they did not use them because they obtained the nutrients they needed from their diet, 15.2% found them expensive, and 5.1% considered them harmful.

Table 2
Distribution of Participants' Dietary Supplement Use

	n	%
Use of dietary supplements		
Not using	158	58.1
Using	114	41.9
Reasons for not using dietary supplements		
No need	91	57.6
Dietary intake of necessary nutrients	35	22.2
Considered expensive	24	15.2
Considered harmful	8	5.1
Reasons for using dietary supplements		
To ensure adequate and balanced nutrition	55	20.2
To prevent iron deficiency	52	19.1
To prevent hair loss	28	10.3
For bone health	16	5.9
To support exercise	10	3.7
Not knowing the reason for use	8	2.9
To protect against the side effects of medications	2	0.7
Form of dietary supplement used		
Tablet	83	30.5
Liquid	23	8.5
Capsule	16	5.9
Powder	7	2.6
Where advice on dietary supplement use is obtained		
Doctor	75	27.6
Pharmacist	20	7.4
Dietitian	16	5.9
Television and Internet	11	4.1
Friend's recommendation	4	1.5
Trainer	2	0.7

Frequency of Dietary Supplement Use Among Participants

The distribution of participants' frequency of nutritional supplement use is shown in Table 3. The majority of multivitamin users (45.5%) reported using them “every day.” Of those using vitamin B12, 35.5% use it “every day,” 29.0% use it “once a week,” and 14.5% use it “once a month.” The majority of participants using vitamin C and magnesium (37.5% and 28.6%, respectively) use them “once a week”; The majority of those using vitamin D, iron, and omega-3 (31%, 54.1%, and 30.3%, respectively) use these supplements “every day”; the majority of those using biotin and calcium (46.7% and 43.8%, respectively) use them “once a week.” Those who use folate mostly indicated that they use it “Every day” (26.7%) and “Once a week” (26.7%). Participants' zinc usage frequency was lower, with the majority (22.7%) reporting that they use it “Once a year.”

Table 3

Distribution of Frequency of Dietary Supplement Use Among Participants Using Supplements

	Every day	Every other day	Once a week	Once every 15 days	Once a month	Once every 6 months	Once a year
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Multivitamin	15(45.5)	6(18.2)	7(21.2)	4(12.1)	-	-	1(3.0)
Vitamin B12	22(35.5)	5(8.1)	18(29.0)	4(6.5)	9(14.5)	3(4.8)	1(1.6)
Vitamin C	5(15.6)	3(9.4)	12(37.5)	4(12.5)	3(9.4)	2(6.3)	3(9.4)
Vitamin D	18(31.0)	5(8.6)	16(27.6)	8(13.8)	4(6.9)	5(8.6)	2(3.4)
Folic acid	4(26.7)	1(6.7)	4(26.7)	2(13.3)	1(6.7)	1(6.7)	2(13.3)
Biotin	2(13.3)	1(6.7)	7(46.7)	-	1(6.7)	2(13.3)	2(13.3)
Calcium	1(6.3)	1(6.3)	7(43.8)	4(25.0)	-	2(12.5)	1(6.3)
Iron	33(54.1)	6(9.8)	10(16.4)	5(8.2)	1(1.6)	3(4.9)	3(4.9)
Magnesium	5(17.9)	6(21.4)	8(28.6)	2(7.1)	3(10.7)	2(7.1)	2(7.1)
Zinc	4(18.2)	2(9.1)	4(18.2)	4(18.2)	-	3(13.6)	5(22.7)
Omega-3	10(30.3)	5(15.2)	9(27.3)	5(15.2)	2(6.1)	1(3.0)	1(3.0)

Participants' Knowledge Levels about Dietary Supplements

Table 4 shows the distribution of participants' knowledge levels regarding dietary supplements. The majority of participants stated that they “agreed” that the use of these supplements is necessary for good health (39.7%), that they can be used optionally (30.1%), that regular use reduces the risk of disease (41.9%), that vitamin C has an immune-boosting effect in the body (47.4%), that they compare the contents before taking multivitamin supplements (33.5%), and that dietary supplements should only be obtained from pharmacies (28.7%). The majority of participants reported that they “disagree” with the idea that nutrients obtained through diet do not meet the body's vitamin, mineral, and other nutrient requirements (29.8%) and that popular products should be preferred when taking multivitamin

supplements (29.4%).

The majority of participants (42.6%, 34.9%, 34.9%, and 35.3%, respectively) stated that they "did not know" whether using dietary supplements increases muscle mass, whether they had sufficient knowledge about dietary supplements, whether they knew how much and for how long dietary supplements should be consumed, and whether they had any side effects. A large portion of the participants (28.3%) stated that they "strongly agree" with preferring glass packaging over plastic packaging for the dietary supplements they use. The average score of the responses to all these questions was calculated. Accordingly, the average score obtained by dividing the total score of the participants' answers to all questions regarding their level of knowledge about nutritional support by the number of questions was found to be 3.0± 0.68 out of 5. This average score was interpreted as indicating that the participants had a better but limited level of knowledge on the subject.

Table 4

Distribution of Participants' Knowledge Levels about Dietary Supplements

	I definitely agree	I agree	I don't know	I disagree	I definitely disagree	Score
	n (%)	n (%)	n (%)	n (%)	n (%)	$\bar{X}$±SD
I believe that the use of dietary supplements is necessary to be healthy.	32 (11.8)	108 (39.7)	50 (18.4)	51 (18.8)	31 (11.4)	3.2 ± 1.21
I believe that dietary supplements can be used optionally.	9 (3.3)	82 (30.1)	41 (15.1)	77 (28.3)	63 (23.2)	2.6 ± 1.23
I believe that the nutrients I get from my diet do not meet my vitamin, mineral, and other nutritional needs.	17 (6.3)	60 (22.1)	77 (28.3)	81 (29.8)	37 (13.6)	2.8 ± 1.13
I believe that using dietary supplements increases my muscle mass.	11(4.0)	40 (14.7)	116 (42.6)	74 (27.2)	31 (11.4)	2.7 ± 0.98
I believe that regular use of dietary supplements lowers my risk of getting sick.	29 (10.7)	114 (41.9)	59 (21.7)	44 (16.2)	26 (9.6)	3.3 ± 1.15
I have sufficient knowledge about dietary supplements.	14 (5.1)	62 (22.8)	95 (34.9)	76 (27.9)	25 (9.2)	2.9 ± 1.03
I know how much and for how long dietary supplements should be consumed.	20 (7.4)	68 (25.0)	95 (34.9)	58 (21.3)	31 (11.4)	3.0 ± 1.1
I believe that vitamin C has an immune-boosting effect in the body.	58 (21.3)	129 (47.4)	40 (14.7)	19 (7.0)	26 (9.6)	3.6 ± 1.17
Dietary supplements have no side effects.	7 (2.6)	25 (9.2)	96 (35.3)	93 (34.2)	51 (18.8)	2.4 ± 0.98
I prefer popular products when taking multivitamin supplements.	24 (8.8)	52 (19.1)	69 (25.4)	80 (29.4)	47 (17.3)	2.7 ± 1.21
I compare the contents before taking multivitamin supplements.	46 (16.9)	91 (33.5)	68 (25.0)	38 (14.0)	29 (10.7)	3.3 ± 1.22
I believe that dietary supplements are addictive.	12 (4.4)	36 (13.2)	93 (34.2)	89 (32.7)	42 (15.4)	2.6 ± 1.04
I believe dietary supplements should only be obtained from pharmacies.	73 (26.8)	78 (28.7)	41 (15.1)	47 (17.3)	33 (12.1)	3.4 ± 1.36
I prefer glass packaging over plastic packaging for the dietary supplements I use.	77 (28.3)	62 (22.8)	71 (26.1)	38 (14.0)	24 (8.8)	3.5 ± 1.28

Participants' Knowledge Level Average Scores According to Their Dietary Supplement Usage Status

Table 5 compares the average knowledge scores of participants according to their use of dietary supplements. According to this, there was a statistically significant difference between the knowledge scores of participants who used dietary supplements and those who did not ($p<0.001$). The median knowledge level score for participants who used dietary supplements was 3.2 (Q1–Q3: 2.92–3.50), while the median score for participants who did not use dietary supplements was 3.0 (Q1–Q3: 2.64–3.28). This result shows that the knowledge level of those who used dietary supplements was higher than that of those who did not.

Tablo 5

Comparison of Participants' Knowledge Level Average Scores According to Their Dietary Supplement Usage Status

Usage of dietary supplements	n	Median (Q1-Q3)	Mean Rank	U	Z	p
Non-users	158	3.0 (2.64-3.28)	121.29	6603.5	-3.758	**<0.001**
Users	114	3.2 (2.92-3.50)	157.57			

p<0.01, Mann Whitney U Test

DISCUSSION

This study evaluated the knowledge levels of university students studying in Konya province regarding dietary supplements. The findings revealed that young adults' awareness, knowledge, and usage habits regarding these products varied significantly. The university period is a time when individuals' eating habits are formed and, due to academic and social pressures, there is an increased tendency to use products that boost energy, concentration, and performance. Therefore, the level of knowledge about dietary supplements is of great importance in terms of developing conscious usage behaviors. With the increasing prevalence of poor dietary habits in society, particularly among university students, the uninformed use of energy drinks and dietary supplements containing caffeine, guarana, ginseng, carnitine, various vitamins (A, D, C, B group), and minerals such as calcium and magnesium has become widespread, posing a significant public health concern (Jagim et al., 2022). A study conducted among university students in Konya revealed that energy drink consumption is widespread among students, with 40.5% of students reported to consume energy drinks (Demet et al.).

Despite claims regarding their safety and benefits, the indiscriminate consumption of these products has been associated with serious cardiovascular problems, including atrial and ventricular myocardial infarctions, arrhythmias, cardiomyopathies, and cardiac death (Kaur et al., 2022). To prevent such situations, it is important to adopt healthy dietary patterns. In particular, sustainable diets are models that preserve biological diversity, are nutritionally adequate, and are economically accessible. The Mediterranean diet, rich in B vitamins and omega-3 fatty acids, may have a depressive symptom-reducing effect, while B12 vitamin, zinc, and omega-3 deficiencies seen in vegan and vegetarian diets can have negative effects on mental health. Therefore, it is important to balance nutrient deficiencies in individuals following such diets with appropriate nutritional supplements (Tokpunar, 2024).

A total of 272 university students participated in this study, 81.2% of whom were female and 18.8% male. The average age was 22.1± 3.81. When examined according to BMI, the majority (63.2%) were found to be within the normal BMI range. In our study, 58.1% of participants used dietary supplements, while 41.9% did not use any dietary supplements. The usage rates obtained in our study are higher than the rates obtained from students in Korea (31.3%) (Kim et al., 2001), the Middle East

(39%) (Alhomoud et al., 2016), Iran (33%) (Sotoudeh et al., 2015), Jordan (27.4%) (Suleiman et al., 2008), Portugal (16%) (Marques-Vidal, 2004), and Croatia (30.5%) (Žeželj et al., 2018); and they are closer to the usage rates of American (52%) (Axon et al., 2017) and Australian (56%) (Wiltgren et al., 2015) students. In a study conducted in Iran, 46.5% of university students generally used dietary supplements, while 41.5% had been using dietary supplements for more than a year (Molani-Gol et al., 2025). In another study involving university student athletes, contrary to our findings, a higher percentage (77%) reported consuming at least one dietary supplement or sports nutrition product (Vento & Wardenaar, 2020). The fact that the participants were athletes limits the comparability of the results. Similarly, another study conducted with university students in Jordan reported that the use of dietary supplements was 60.9% (Elsahoryi et al., 2023).

In our study, when participants were asked why they did not use dietary supplements, more than half (57.6%) stated that they did not need them. Of the remainder, 22.2% reported not using them because they obtained the nutrients they needed from their diet, 15.2% found them expensive, and 5.1% considered them harmful. In line with the findings of another study, the main reasons for not using them were the high cost of dietary supplements and fear of side effects (Riaz et al., 2025). In the current study, participants preferred to take dietary supplements in tablet form (30.5%). In another study, tablets were consistently the most common form of dietary supplement preferred by 68.4% of participants, followed by capsules at 26.7% (Alshehri et al., 2025).

In our study, the most common sources of advice regarding the use of dietary supplements were, in order, doctors (27.6%), pharmacists (7.4%), and dietitians (5.9%). Consistent with these results, a study conducted with university students in Iran reported that the most common sources of information regarding dietary supplement intake were clinicians (physicians, pharmacists, dietitians) (40.0%), family (15.5%), the internet (15.0%), and pharmacists or pharmacy staff (10.5%) (Molani-Gol et al., 2025).

In another study with opposite results, the internet had the strongest influence (66.1%), followed by healthcare professionals in second place (33.2%) (Žeželj et al., 2018). Another study conducted among Japanese high school students found that students who actively purchased dietary supplements obtained most of their information via the internet, while for passive students who did not purchase supplements, their families were the most important source of information. Active participants who used dietary supplements were more likely to believe that these products were safe and that the information shared among users was more reliable, compared to passive users and non-users (Nishijima et al., 2019). The internet provides a wealth of information about dietary supplements, but it can also provide unreliable and unverified data that may lead to incorrect decisions regarding their use. Therefore, our current findings provide useful information about the use and prevalence of dietary supplements, attitudes toward their use among young people, and the reasons for this use, offering valuable support for public health actions. Given that our current data shows that 58.1% of participants use dietary supplements, it is particularly important that health professionals, rather than the internet, are preferred as a reliable source of information about these products. Decisions about reliable sources among the young population are critically important for supporting better health choices. Tareq and his colleagues' research revealed that individuals most often obtain information about dietary supplements from family, friends, and close acquaintances (Tareq et al., 2022). Previous studies investigating dietary supplement use have revealed that the primary sources of information about these supplements are family members, friends, and healthcare professionals (Al-Naggar & Chen, 2011; Žeželj et al., 2018).

In our findings, it was determined that a large proportion of participants using multivitamins, vitamins B12, C and folate, as well as iron and omega-3 supplements, took these supplements regularly every day (respectively; 45.5%, 35.5%, 31%, 26.7%, 54.1%, 30.3%). A study conducted in Jordan

indicated that single-nutrient supplements were used more frequently (Elsahoryi et al., 2023). Consistent with our findings, another study reported that vitamins were most frequently used supplements (13.8%) (Žeželj et al., 2018). Similarly, in a study in Saudi Arabia, the most frequently used type of dietary supplement was multivitamins (44.9%), followed by monovitamins (39.9%), minerals (7.5%), and protein products (4.1%) (Alshehri et al., 2025). A study conducted in Pakistan indicated that a significant majority (71.3%) of female undergraduate students used dietary supplements, while 60.5% used multivitamins and minerals (Kalhoro et al., 2025). Among university students in Iran, the most commonly used dietary supplements were reported to be vitamin D, followed by iron and folic acid tablets. It was found that participants with chronic illnesses had a higher rate of dietary supplement use (Tareq et al., 2022). This result, consistent with other studies, shows that vitamins are the most popular dietary supplements among students (Al-Naggar & Chen, 2011; Sotoudeh et al., 2015; Stanojević-Ristić et al., 2017). Similarly, various studies show that multivitamins and multivitamin-mineral combinations are the most preferred dietary supplements among students (Darvishi et al., 2013; Saeedi et al., 2013; Suleiman et al., 2008). In line with our findings, another study conducted with student athletes also reported that the most commonly used supplements were multivitamins and mineral supplements (65%) and single vitamins or minerals (64% and 63%, respectively) (Vento & Wardenaar, 2020). In studies conducted with student athletes, it has been reported that the use of prohibited dietary supplements (e.g., amino acids, creatine, dehydroepiandrosterone) is higher among male athletes, whereas female athletes use permitted supplements (e.g., multivitamins, calcium, and iron) at a higher rate (Froiland et al., 2004; Kristiansen et al., 2005; Wardenaar et al., 2017).

The reasons individuals use dietary supplements are also related to their level of health literacy. In a study investigating health literacy among high school students, it was found that 39.4% of participating students had inadequate or problematic/limited health literacy, while 60.6% had adequate or excellent health literacy. Significant differences in health literacy were observed between school types (Aksoy & Hisar, 2024). Our study found that the main reasons participants used dietary supplements were to ensure adequate and balanced nutrition (20.2%), prevent iron deficiency (19.1%), and prevent hair loss (10.3%). In addition, the majority of participants agreed that the use of these supplements is necessary to be healthy (39.7%), that they can be used optionally (30.1%), that regular use reduces the risk of disease (41.9%), that vitamin C has an immune-boosting effect in the body (47.4%), comparing the contents before taking multivitamin supplements (33.5%), and that dietary supplements should only be obtained from pharmacies (28.7%). Similar to our findings, another study reported that participants' primary motivations for using dietary supplements were to maintain their health (26.4%), ensure adequate nutrition (24.6%), and meet their energy needs (23.7%) (Žeželj et al., 2018). In another study, the most common reasons for use were consistently listed as maintaining general health and well-being (29.5%), preventing hair loss, and having healthy skin (17.5%) (Molani-Gol et al., 2025). In a similar study, nearly half of the participants had heard of dietary supplements, but only 41% were actual users. The most common reasons for using dietary supplements were cosmetic purposes and weight loss (Riaz et al., 2025). Another study reported that the majority of undergraduate students (63.43%) believed vitamin and mineral supplements were beneficial, while a smaller proportion of graduate students (21.64%) held this belief (Francis et al., 2022). These findings are aligned with previous studies reporting similar results regarding the reasons for using dietary supplements (Al-Naggar & Chen, 2011; Alhomoud et al., 2016; Axon et al., 2017; Elsahoryi et al., 2023). It has also been reported that dietary supplements can be used effectively and safely to address vitamin and mineral deficiencies in women with premenstrual syndrome (Sultana et al., 2022). A study found that as the subscale scores for “fatigue” and ‘irritability’ on the premenstrual syndrome scale (PMSS) increased, the levels of calcium, magnesium, phosphorus, zinc, potassium, magnesium, copper, vitamins B1, B2, biotin, omega-3, omega-6, “riboflavin,” E, B1, B2, B5, B6 vitamins, folate, and iron levels decreased (Duman & Arslan,

2024). The use of nutritional supplements such as magnesium, B vitamins, vitamin E, and calcium, especially when combined with changes in diet, helps alleviate PMS symptoms (Bussell, 1998).

In our current study, the majority of participants responded "I don't know" to the statements regarding "the belief that using nutritional supplements increases muscle mass, having sufficient knowledge about nutritional supplements, knowing how much and for how long nutritional supplements should be consumed, and that there are no side effects" (respectively; 42.6%, 34.9%, 34.9%, 35.3%). Based on the research results, another study found that among all participants, even those who stated they did not use nutritional supplements, there was a low level of knowledge, negative attitudes, and high risk among users regarding nutritional supplement use. In similar findings, another study reported that among all participants, including those who stated they did not use dietary supplements, users had low levels of knowledge about dietary supplements and exhibited negative attitudes and high-risk usage behaviors (Elsahoryi et al., 2023). In a study conducted with university student athletes, it was found that only 16% of participants were knowledgeable about dietary supplements and their effects (Vento & Wardenaar, 2020). A study conducted in Pakistan reported significant knowledge gaps among undergraduate students on this subject. Sixty-two point five percent of students believed that dietary supplements could cure diseases, and only 46% were aware of their potential side effects. Despite positive attitudes, risky behaviors were evident; 26% were using more than one dietary supplement at the same time, and 24.5% were experiencing adverse effects (Kalhoro et al., 2025). In another study, it was found that medical students knew what dietary supplements were and that they were not always safe, and that their level of knowledge was significantly higher than that of non-medical students, likely due to the courses they took on pharmacology and the risks of dietary supplements. Other studies have also reported a similar level of adequate knowledge regarding the use of dietary supplements (Al-Naggar & Chen, 2011; Alhomoud et al., 2016; Azizi et al., 2011). Similarly, another study showed that 85.0% of students knew what dietary supplements were, but only a small number of students (10.5%) had attended a health workshop on dietary supplements. Most students (64.5%) used these supplements without professional guidance. 59.5% of participants reported following the instructions on the product label when using the supplement. In addition, a large majority (73.5%) believed that medications, foods, or beverages taken with dietary supplements could interact, and that dietary supplements recommended by health professionals were more effective (78.5%) (Molani-Gol et al., 2025). In a study conducted in Saudi Arabia on knowledge, attitudes, and practices regarding the use of dietary supplements, most participants (82.5%) were aware of what dietary supplements were, but only 41% knew the correct dosages and methods of use. A significant proportion of participants (27.1%) expressed uncertainty about correct usage. While 55% of participants believed that dietary supplements were unsafe, 30.3% were unsure. Knowledge about possible side effects and drug interactions was limited, with 39.7% of participants unaware of these issues. However, a large majority (92.6%) believed that more education about dietary supplements was needed and emphasized a significant gap in knowledge. Furthermore, the majority of participants (74.4%) agreed that an adequate and balanced diet could sufficiently meet the need for dietary supplements (Alshehri et al., 2025).

In our study, the average scores of participants who used dietary supplements and those who did not were compared in terms of their knowledge level about dietary supplements. The analysis results showed that the knowledge level of individuals who used dietary supplements was statistically significantly higher than that of those who did not ($p<0.001$). In a recent study conducted among university students in Turkey, however, no significant difference was found between the average knowledge level scores of participants who used dietary supplements and those who did not ($p = 0.411$). In the same study, 33% of participants with sufficient knowledge used dietary supplements, while 67% did not. Among individuals with insufficient knowledge, these rates were reported as 15.9% and 84.1%, respectively (Öztürk, 2025). In addition, another study conducted in Turkey found no significant

difference in the knowledge levels of university students who used dietary supplements and those who did not ($p = 0.278$) (Erzurum Alim, 2021). On the other hand, a study conducted among university students in the United Arab Emirates found statistically significant differences in knowledge and belief levels between dietary supplement users and non-users ($p<0.001$). In this study, 68.3% of participants who used dietary supplements agreed that dietary supplements are necessary for health, while only 32.3% of those who did not use them shared the same view (Radwan et al., 2019).

In the literature, individuals' attitudes toward the use of dietary supplements and their knowledge levels have generally been discussed in terms of frequency, and studies measuring knowledge levels using quantitative and objective methods are limited. In future research, the development of scales that can measure knowledge levels objectively and reliably will strengthen the literature in this field and increase the accuracy of assessments regarding individuals' use of dietary supplements.

LIMITATIONS

The present study provides useful information for public health messages. This study has some limitations, such as its cross-sectional design and relatively small sample size. Furthermore, the data collected are based on participants' self-reports. This may limit the generalizability of the study due to its nature. However, another limitation of the study is the lack of any developed scale for measuring knowledge levels about dietary supplements using quantitative and objective methods.

CONCLUSION AND RECOMMENDATIONS

It is crucial to integrate awareness about the use of dietary supplements into daily life. To ensure these products can be used safely, responsibly, and judiciously, the public must have access to accurate, evidence-based information about their benefits, risks, potential side effects, and drug-nutrient interactions. Accordingly, reliable and targeted educational strategies must be developed. The use of dietary supplements only on the recommendation of healthcare professionals specializing in the field is important in terms of preventing possible health risks. Educational programs aimed at raising awareness about healthy eating habits and dietary supplements should be widespread throughout society, especially among younger age groups. In addition, awareness campaigns conducted through mass media and social media platforms will contribute to raising the level of public knowledge by reaching a wide audience.

Ethics Statement

This study was conducted by Dr. Meryem Ayrancı Pınarcık, is derived from the undergraduate dissertation entitled "Konya İlinde Eğitim Gören Üniversite Öğrencilerinin Besin Destekleri Hakkındaki Bilgi Düzeylerinin Değerlendirilmesi".

Additionally, this article was developed based on the content of the paper titled “Evaluation of University Students’ Knowledge Levels Regarding Dietary Supplements: The Case of Konya Province,” which was presented as an oral presentation at the 3rd Nutrition and Metabolism Symposium held in Konya on May 15-16, 2025, but whose full text has not been published.

Ethical Approval

Ethical approval was granted by the Scientific Research Ethics Committee of the Faculty of Health Sciences at Necmettin Erbakan University in Konya on November 1, 2023, with decision number 2023/596.

Author Contributions

Research Design (CRediT 1) Meryem AYRANCI PINARCIK (60%), İlknur HACIOĞLU (20%),

SÜMEYYE SEİS (20%)

Data Collection (CRediT 2) Meryem AYRANCI PINARCIK (10%), İlknur HACIOĞLU (45%), Sümeyye SEİS (45%)

Research - Data Analysis - Verification (CRediT 3-4-6-11) Meryem AYRANCI PINARCIK (80%), İlknur HACIOĞLU (10%), Sümeyye SEİS (10%)

Writing the Article (CRediT 12-13) Meryem AYRANCI PINARCIK (90%), İlknur HACIOĞLU (5%), Sümeyye SEİS (5%)

Revision and Improvement of Text (CRediT 14) Meryem AYRANCI PINARCIK (90%), İlknur HACIOĞLU (5%), Sümeyye SEİS (5%)

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Conflict of Interest

There is no conflict of interest among the authors arising from this work.

Sustainable Development Goals (SDGs)

Sustainable Development Goals: 3 Good Health and Well-Being.

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