

# Assessment of Knowledge and Attitudes on Dietary Supplement Use: Scale Development and Application Among University Students

## Gıda Takviyesi Kullanımına İlişkin Bilgi ve Tutumların Değerlendirilmesi: Ölçek Geliştirme ve Üniversite Öğrencileri

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### ABSTRACT

The purpose of this study was to investigate university students' attitudes and understanding about the usage of vitamin and mineral supplements. The study was conducted on 359 students studying at Ardahan University using a cross-sectional descriptive method. Data were collected through a questionnaire, and the validity and reliability of the measurement tool were analyzed. Exploratory Factor Analysis was performed to validate the structure and reliability of the measurement tool, with Cronbach's Alpha values confirming its robustness. For statistical analyses, t-tests and chi-square tests were used. According to the findings, 22.6% of the participants reported using supplements. The most preferred supplements were vitamin B12 (23.7%) and iron (19.8%). The most common reason for supplement use was health protection and improvement (35.9%). Additionally, 33% of the students with adequate knowledge about nutrition used supplements, while only 15.9% of those with inadequate knowledge used supplements ( $p < .001$ ). These results indicate that the level of awareness significantly affects the use of supplements. The study concludes that awareness levels play a critical role in the use of supplements and highlights the need to increase awareness of healthy nutrition among university students. It emphasizes the importance of educational programs to promote conscious supplement use and healthy eating habits among young adults.

**Keywords:** dietary supplements, students, vitamins, attitude to health, nutritional status

### Öz

Bu çalışmanın amacı, üniversite öğrencilerinin vitamin ve mineral takviyesi kullanımına yönelik tutumlarını ve bilgi düzeylerini incelemektir. Çalışma, Ardahan Üniversitesi'nde öğrenim gören 359 öğrenci üzerinde kesitsel tanımlayıcı yöntem kullanılarak gerçekleştirilmiştir. Veriler anket yoluyla toplanmış ve ölçüm aracının geçerlilik ve güvenilirlik analizleri yapılmıştır. Ölçüm aracının yapı ve güvenilirliğini doğrulamak için Açıklayıcı Faktör Analizi uygulanmış ve Cronbach Alfa değerleri ölçme aracının kullanılabilirliğini doğrulamıştır. İstatistiksel analizler için t-testi ve ki-kare testi kullanılmıştır. Bulgulara göre, katılımcıların %22,6'sı gıda takviyesi kullanmaktadır. En çok tercih edilenler %23,7 ile B12 vitamini ve %19,8 ile demir olmuştur. Takviye kullanımının en yaygın nedeni %35,9 ile sağlık koruma ve iyileştirme olarak belirlenmiştir. Ayrıca, beslenme konusunda yeterli bilgiye sahip öğrencilerin %33'ü takviye kullanırken, yetersiz bilgiye sahip olanların yalnızca %15,9'u takviye kullanmıştır ( $p < ,001$ ). Sonuçlar, farkındalık düzeyinin takviye kullanımını önemli ölçüde etkilediğini göstermektedir. Sağlıklı beslenme farkındalığının artırılması, bilinçli takviye kullanımını teşvik etmek açısından büyük önem taşımaktadır. Bu çalışma, genç yetişkinler arasında bilinçli takviye tüketimini ve sağlıklı beslenme alışkanlıklarını teşvik etmeye yönelik eğitim programlarına duyulan ihtiyacı vurgulamaktadır.

**Anahtar Kelimeler:** gıda takviyeleri, öğrenciler, vitaminler, sağlığa karşı tutum, beslenme durumu

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## Introduction

Food supplements are defined as products that are concentrations, metabolites, compounds or combinations of one or more vitamins, minerals, plants (excluding tobacco) or amino acids consumed for dietary support by the 'American Dietary Supplement Health and Education Administration' in 1994 (Geller et al., 2015; Rautiainen et al., 2016). Vitamins D, E, A, C, B6, B12, thiamine, biotin, niacin, folate, riboflavin and pantothenic acid; minerals, chromium, iron, manganese, zinc, magnesium, calcium, selenium, copper and iodine; plants, garlic, ginkgo, dandelion, chamomile, thistle, pepper, valerian, yohimbe, and guarana; amino acids; and a variety of food supplements, including bone meal, fish oil, bee pollen, blue-green algae and melatonin, are all included in the 1994 Dietary Supplements Health and Education Act (DSHEA) (Camire & Kantor, 1999).

The concentrated nutrients found in nutritional supplements can prevent, relieve, improve, or affect the body's physiological functions (Barnes et al., 2016). For a variety of performance-enhancing, aesthetic, or health issues, including balancing their diet, making up for vitamin deficits in their diet or exercise, or enhancing their look, health, or mental state, people may also resort to food supplements (Petroczi et al., 2011).

Natural foods and a balanced/adequate diet can help people maintain their health and vitality. People's diets may change for various reasons (such as high work pace and population growth) and they may need food supplements. On the other hand, as the communication network has grown, the need for dietary supplements has also increased. The perception that dietary supplements are all-natural, safe and widely available (no prescription needed, easily accessible online and/or in supermarkets) are other factors driving the growing demand (Kanak et al., 2021).

According to studies, almost 75% of people in developed nations use one or more dietary supplements, demonstrating the widespread use of these products (Bailey et al., 2011; Timbo et al., 2006). According to a survey done in Turkey, 40.8% of college students used nutritional supplements (Tunçer et al., 2020). The advantages of dietary supplements for different groups are unknown, despite their widespread use. Dietary supplements carry a number of known risks, such as ingredient contamination, unforeseen repercussions, and unanticipated adverse effects. Moreover, deceptive

nutritional labeling and health claims may be used in supplement advertising (Harrison et al., 2003; Harvey et al., 2008).

Today, many people use dietary supplements to make sure they get enough nutrients, to be healthier and more active, to cure or prevent diseases, or both. In other words, there is an uncontrolled use of dietary supplements. The safety of such uncontrolled use of dietary supplements should be questioned (ER, 2019).

This study examines university students' knowledge and attitudes toward vitamin and mineral use. The rising popularity of dietary supplements has led to increased consumption, particularly among young adults. However, unconscious use poses health risks. Identifying knowledge gaps in this group, despite their access to information, is crucial for individual and public health. The study aims to assess students' knowledge levels and reasons for supplement use. The study also aims to develop recommendations to raise awareness of the use of dietary supplements among university students.

## Material and Methods

### Material

This study was conducted on 359 students studying at Ardahan University to analyse the knowledge levels and attitudes of university students about the use of vitamin and mineral supplements. The sample size was calculated using a formula from raosoft.com website (*Sample Size Calculator by Raosoft, Inc.*, n.d.). The study was designed as a cross-sectional descriptive study. Data were collected using a questionnaire. For the application of the questionnaire, ethics committee approval was obtained from Ardahan University with the date: September 30, 2024, decision numbered E-67796128-819-2400031862. Consent was obtained from all participants in the study.

### Participants

Random sampling was used to choose the participants, and enrollment at the university where the study was carried out was a requirement for inclusion. Demographic information (gender, age, height, weight, marital status, health status) and questions related to vitamin-mineral use were collected with a questionnaire form.

### Data Collection Instruments

The questionnaire used for data collection consists of

four main sections:

**General Information:** It includes demographic data such as gender, age, health status, dieting status of the participants.

**Vitamin and Mineral Use:** It includes questions such as the frequency of using vitamin and mineral supplements, reasons, which products they use and where they obtain these products.

**Knowledge:** It consists of statements that measure the level of knowledge of the participants about vitamins and minerals. Participants were asked to evaluate these statements with 'True', 'False' or 'I don't know' options.

**Opinions:** It includes questions about attitudes towards vitamin and mineral supplements. Participants rated this section on a five-point Likert scale (from 'Strongly Disagree' to 'Strongly Agree') (Delikanlı Akbay & Karakullukçu, 2024; Zarembo & Conduit-Turner, 2025).

### Assessment of Knowledge Test

While evaluating the answers to the questions in the 'Knowledge' section of the research, the answers given by the participants were scored and average knowledge scores were obtained. Knowledge scores were calculated by giving 1 point for the 'correct' answer and 0 points for 'wrong' and 'I don't know', as is commonly done in the literature; the total score was obtained as the arithmetic sum of the relevant items (Manzano-Felipe et al., 2022). After the scoring, total scores were calculated and analysed in the 'Knowledge' section consisting of 20 questions.

### Validity and Reliability Analysis of the Measurement Instrument

Exploratory Factor Analysis (EFA) was used to assess the measurement tool's validity. Principal components analysis and direct oblique rotation were applied, assuming a relationship between elements. Sample adequacy was evaluated with the Kaiser-Meyer-Olkin (KMO) test, and the Bartlett Sphericity Test assessed item correlations (Büyükoztürk et al., 2012).

Reliability analyses of the scales were performed with Cronbach Alpha coefficient. The accepted lower value for the coefficient was determined as 0.60 (Mallery & George, 2010).

### Statistical Analysis

IBM statistical program SPSS 21.0 (IBM SPSS Corp., Armonk, NY, USA) was used to analyze the data that was gathered. To assess whether the data conformed to a normal distribution, the Kolmogorov-Smirnov test was employed. The Pearson chi-square ( $X^2$ ) test and descriptive statistics (frequency, percentage, and mean) were used for categorical data, whereas the T-test (t) was used to analyze non-categorical variables between groups. For  $p < .05$ , the results were deemed statistically significant.

### Results

Considering the demographic characteristics of the participants, 82.2% were female and 17.8% were male. In the distribution of students according to body mass index (BMI) groups, 79.7% were classified as normal weight, 12.3% as underweight and 8.1% as overweight. Most of the students (93.6%) stated that they did not diet and 51.8% stated that they did not take a course on nutrition. In addition, 61.3% of the participants stated that they had sufficient knowledge about vitamin/mineral supplements. (Table 1).

**Table 1.**  
*Demographic and personal characteristics of the study participants*

	Variables	n	(%)
<b>Gender</b>	Female	295	82.2
	Male	64	17.8
<b>BMI Group</b>	Underweight	44	12.3
	Normal	286	79.7
	Overweight	29	8.1
<b>Diets</b>	Chron Diet	6	1.7
	No Diet	336	93.6
	Weight Loss Diet	6	1.7
	Other Diets	11	3.2
<b>Taking Nutrition Course</b>	Yes	173	48.2
	No	186	51.8
<b>Age group</b>	18-20	100	27.9
	21-30	258	71.9
	30-40	1	0.3
<b>Knowledge of supplements</b>	Sufficient	139	38.7
	Insufficient	220	61.3

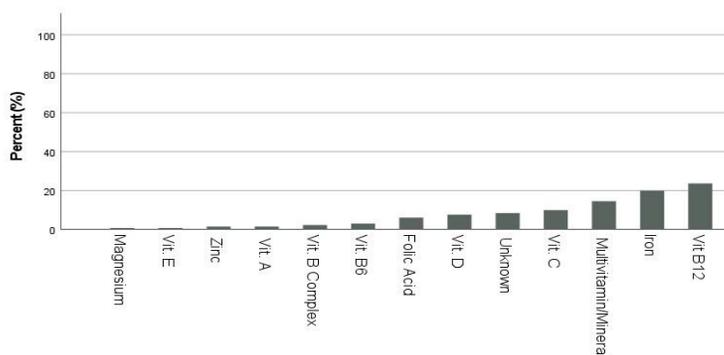
Among the main reasons for the use of vitamin and mineral supplements, 35.9% stated that they use supplements for health protection and improvement, 19% for energy supplementation and 14.8% for disease treatment. In addition, 24.6% of students who have anaemia problems also prefer these products (Table 2).

**Table 2.**  
*Reasons for Vitamin-Mineral Supplement Use of Participants*

	n	(%)	
Reasons for using vitamin/mineral supplements	Protecting and improving health	51	35.9
	Losing weight	1	0.7
	For Energy	27	19.0
	Anemia	35	24.6
	Physical appearance	7	4.9
	Treatment of disease	21	14.8

When the vitamin and mineral supplements used were analysed, 23.7% used vitamin B12, 19.8% used iron and 14.5% used multivitamin/mineral supplements. On the other hand, 8.4% stated that they did not have information about the content of supplements (Figure 1).

**Figure 1.**  
*Content of the vitamin-mineral supplement used*



The data related to the results of the chi-square analysis performed by comparing the use of dietary supplements with various sociodemographic characteristics are as follows: 22.5% of the participants used dietary supplements, but there was no statistical difference in

terms of use according to gender. When the level of knowledge about supplements is evaluated, 33% of those with adequate knowledge use supplements and 67% do not use supplements. These rates were 15.9% and 84.1% in those with insufficient knowledge. The difference between supplement use and knowledge status was found to be statistically significant ( $p < .001$ ) (Table 3).

**Table 3.**  
*Analysis of Sociodemographic Characteristics According to Dietary Supplement Use*

		Supplementation Status	n	(%)	p
Gender	Male	Yes	14	21.8	.885
		No	50	78.1	
	Female	Yes	67	22.7	
		No	228	77.3	
Age group	18-20	Yes	25	25	.691
		No	75	75	
	21-30	Yes	56	21.7	
		No	202	78.3	
	30-40	Yes	0	0	
		No	1	100	
Diets	Yes	Yes	6	26	.676
		No	17	74	
	No	Yes	75	22.3	
		No	261	77.7	
BMI Group	Underweight	Yes	13	29.5	.285
		No	31	70.5	
	Normal	Yes	64	22.3	
		No	222	77.7	
	Overweight	Yes	4	13.7	
		No	25	86.3	
Taking Nutrition Course	Yes	Yes	36	20.8	.443
		No	137	79.2	
	No	Yes	45	24.1	
		No	141	75.9	
Knowledge of supplements	Sufficient	Yes	46	33	<.001*
		No	93	67	
	Insufficient	Yes	35	15.9	
		No	185	84.1	

**\*Results of chi-square analysis**

Gender, chronic disease status, dieting status, taking a nutrition course and vitamin-mineral knowledge are important factors affecting the content of vitamin and mineral supplements used by students. Females used multivitamin/mineral ( $p=.01$ ) and B12 ( $p=.007$ ) supplements significantly more than males. Individuals with chronic diseases prefer iron ( $p=.026$ ) and folic acid ( $p<.001$ ) supplements more. Dietary status did not have a significant effect on supplement use in general. Students who did not take a nutrition course did not know the content of supplements and this was statistically significant ( $p=.043$ ). Students with sufficient vitamin-mineral knowledge prefer multivitamin/mineral ( $p=.025$ ), B12 ( $p=.021$ ), vitamin C ( $p=.021$ ), vitamin D ( $p=.039$ ) and iron ( $p<.0001$ ) supplements more (Table 4).

**Table 4.***Analysis of the Vitamin-Mineral Supplement Content*

Supplement Content	Gender	Chronic Disease Condition	Diets	Taking Nutrition Course	Knowledge of supplements
	<i>p</i>				
Unknown	.421	.357	.712	.043*	.871
Multivitamin/Mineral	.01*	.382	.113	.136	.025*
Vitamin B6	.349	.582	.599	.356	.642
Vitamin B12	.007*	.053	.242	.250	.021*
B complex	.418	.634	.649	.611	.848
Folic Acid	.360	<.001*	.477	.644	.270
Vitamin C	.815	.224	.847	.881	.021*
Vitamin A	.509	.698	.711	.141	.074
Vitamin D	.694	.702	.401	.340	.039*
Vitamin E	.641	.784	.793	.334	.208
Iron	.193	.026*	.678	.314	<.001*
Magnesium	.641	.784	.064	.334	.208
Zinc	.233	.698	.711	.959	.074

**\*Results of chi-square analysis**

According to the other findings presented, gender, taking a nutrition course and vitamin-mineral knowledge have a important effect on students' knowledge scores. The knowledge scores of female participants were higher than those of male participants (mean 13.94 vs. 13.21), but this difference was not statistically significant. The knowledge scores of the students who took courses on nutrition were

significantly higher than those who did not (mean 15.06 vs. 12.64,  $p < .001$ ). In addition, the knowledge scores of the students who thought that they had sufficient knowledge about vitamins and minerals were significantly higher than those who stated that they did not have sufficient knowledge ( $p < .001$ ) (Table 5).

**Table 5.***The Effect of Gender, Health Status and Other Factors on Knowledge Scores*

		n	Mean Knowledge Score	SD	<i>p</i>
<b>Gender</b>	Male	64	13.21	3.84	.118
	Female	295	13.94	3.22	
<b>Chronic Disease Condition</b>	Yes	25	13.96	3.96	.821
	No	334	13.80	3.30	

**Table 5.**  
*The Effect of Gender, Health Status and Other Factors on Knowledge Scores (Continued)*

<b>Diets</b>	Yes	23	14.21	3.37	.551
	No	336	13.78	3.35	
<b>Taking Nutrition Course</b>	Yes	173	15.06	2.78	<.001*
	No	186	12.64	3.41	
<b>Knowledge of supplements</b>	Sufficient	139	14.91	3.18	<.001*
	Insufficient	220	13.11	3.27	
<b>Use of supplements</b>	Yes	81	13.54	3.64	.411
	No	278	13.89	3.26	

\*Results of the t-test analysis

### Findings of the Validity and Reliability Analysis of the Scale

Exploratory Factor Analysis (EFA) was conducted to assess the construct validity and factor structure of the Vitamin and Mineral Knowledge Scale (VMKS) on vitamin and mineral supplement knowledge. Principal components analysis and direct oblique rotation were used, assuming variable correlation.

The sample was adequate for EFA, with a KMO value of **Figure 2.**

*Results of the vitamin and mineral knowledge scale (VMKS) analysis*

.803 and the lowest item-specific KMO at 0.881 (Field & Golubitsky, 2009). Bartlett's Test confirmed sufficient item correlations ( $\chi^2(190) = 970.342; p < .05$ ).

EFA identified a 7-factor structure explaining 55.4% of the variance, with sub-dimensions contributing 18.8%, 7.8%, 6.5%, 5.8%, 5.7%, 5.4%, and 5.1%, respectively. Factor loadings were all  $\geq 0.435$ , validating item contributions (Figure 2).

Questions	Factors						
	1	2	3	4	5	6	7
q1		0.505					
q2			0.721				
q3				0.795			
q4			0.553				
q5							0.795
q6	0.624						
q7		0.501					
q8	0.517						
q9					0.622		
q10						0.594	
q11	0.447						
q12						0.652	
q13					0.645		
q14		0.751					
q15		0.652					
q16	0.478						
q17	0.435						
q18	0.712						
q19	0.738						
q20	0.666						
<b>Explained Variance</b>	18.8	7.8	6.5	5.8	5.7	5.4	5.1
<b>Total explained variance: 55.40</b>							

Cronbach's Alpha reliability analysis yielded  $\alpha=0.751$ , confirming VMKS as a reliable measurement tool, as values above 0.60 indicate sufficient reliability (Mallery & George, 2010).

Exploratory Factor Analysis (EFA) was conducted to assess the construct validity and factor structure of the Vitamin and Mineral Thinking Scale (VMTS) on vitamin and mineral supplements. Principal components analysis and direct oblique rotation were used, assuming variable correlation.

**Figure 3.**

*Results of the vitamin and mineral thinking scale (VMTS) analysis*

Questions	Factor 1	Factor 2
q1		0.605
q2	0.736	
q3	0.748	
q4		0.879
q5	0.702	
q6	0.684	
<b>Eigenvalue</b>	2.32	1.15
<b>Explained Variance</b>	38.73	19.21
<b>Total explained variance : 57.94</b>		

Cronbach's Alpha reliability analysis showed an overall reliability of  $\alpha=0.607$ , with factor 1 at  $\alpha=0.705$  and factor 2 at  $\alpha=0.30$ . Despite factor 2's low reliability, VMTS was deemed a reliable measurement tool, as a Cronbach Alpha above 0.60 is generally acceptable (Mallery & George, 2010).

### Discussion

Diet and nutrition is one of the most important environmental factors affecting individuals' development, psychophysical activity, learning capacity and general health as adults. Young people often follow a modern dietary pattern that is very different from dietary recommendations and does not allow them to fulfil their nutritional requirements. Most diet-related disorders are caused by vitamin and mineral deficiencies. Naturally, this leads to increased use of nutritional supplements (Kłosiewicz-Latoszek et al., 2008). The findings obtained in this study regarding the vitamin and mineral supplement usage habits, knowledge levels and attitudes of university students provide important findings when compared with other studies in the literature.

The sample was adequate for EFA, with a KMO value of 0.697 and a minimum item-specific KMO of 0.70 (Field & Golubitsky, 2009). Bartlett's test confirmed sufficient item correlations ( $\chi^2(15) = 356.114$ ;  $p < .05$ ).

EFA identified a two-factor structure for the six-item scale, explaining 57.94% of the variance—38.73% from the first factor and 19.21% from the second (Figure 3).

Our findings show that students most frequently used B12 and iron supplements (Figure 1). This finding is in line with Bailey et al. (2011) who found that B12 and iron deficiency is common especially among women and therefore these supplements are frequently preferred. This may be explained by the fact that iron deficiency in women is associated with anaemia due to iron loss through menstruation. In addition, the fact that 82.2% of the participants in our study were women may also be effective in the emergence of this result. In addition, the majority of participants who used multivitamins stated that they used these supplements to maintain their general health (Table 2). This result is in line with the Timbo et al. (2006) study, which showed that multivitamins are one of the supplements that are most often utilized.

According to our research, the majority of students (34.9%) used vitamin and mineral supplements primarily for health protection and enhancement (Table 2). This is consistent with research showing that taking vitamin and mineral supplements is a popular way to enhance overall health (Aina & Ojedokun, 2014; Alowais & Selim, 2019; Harrison et al., 2003; Kobayashi et al., 2017). Nonetheless, 24.6% of the students reported using these supplements to

address their anemia issue. The use of vitamins associated with anaemia, such as B12 and iron, is commonly associated with anaemia problems in the literature (Bailey et al., 2011).

Table 3 shows that the study population's rate of dietary supplement usage was 22.6%, which was lower than the study of Alim et al. (2021) (28.5%) but higher than certain studies of Turkish university students (11.2%, and 10.7%) (Ayranci et al., 2005; Kara, 2019). Furthermore, compared to the majority of the research currently available on US college students, which cites supplementing rates ranging from 53.6% to 80.0%, the prevalence of dietary supplement usage in our sample was substantially lower (Lieberman et al., 2015; Valentine et al., 2017). Female students were found to report higher supplement use compared to male students, but this difference was not statistically significant. This finding is consistent with results observed in other student populations (Steele & Senekal, 2005).

Regarding the usage of dietary supplements, there was no discernible difference between men and women by gender ( $p = .885$ ) (Table 3). This finding contradicts the result of the study conducted by I. Bailey et al. (2011) that women use more supplements than men. However, Doğan et al. (2020) reported that gender had no significant effect on supplement use in a study conducted in Turkey, supporting our finding. The observation of differences between studies may be due to cultural and socioeconomic differences, dietary habits and gender roles in different countries. The results of studies conducted in different countries may therefore vary.

When the age groups were analysed, it was observed that there was no significant difference between the groups ( $p = .691$ ) (Table 3). This result suggests that the supplement use habits of young adults are similar and age is not a determining factor, which is in line with some general trends in the literature (Alfawaz et al., 2017)

In terms of dieting status, it was found that the statistical difference for supplement use was not significant when the dieting students were compared with the non-dieting students ( $p = .676$ ) (Table 3). This finding is in parallel with the result of the study conducted by Özüpek and Arslan (2021) that dieting does not directly affect supplement use.

There was no significant difference between the BMI groups for dietary supplement use ( $p = .285$ ) (Table 3). This suggests that body weight alone is not sufficient in determining supplement use. Similarly, studies in the

literature suggest that the evidence for associations between BMI and dietary supplement use is not conclusive and further research is needed (Bailey et al., 2013; Egras et al., 2011; Kozłowska L. & Pol, 2013)

When the status of taking a nutrition course was evaluated, it was determined that the statistical difference for supplement use between the students who took the course and those who did not take the course was not significant ( $p = .443$ ) (Table 3). This finding indicates that formal nutrition education does not have a direct effect on supplement use habits. Again, Doğan et al. (2020) provides support for this conclusion, because a similar effect was not observed in their study.

A strong association was established between the amount of knowledge about supplements and supplement use ( $p < .001$ ) (Table 3). This finding emphasises the importance of educational programmes and information on supplement use and supports other studies in the literature. Similarly, Bailey et al. (2011) found that people who had information about supplements used supplements more consciously and regularly. In addition, Doğan et al. (2020) also stated that increasing the knowledge level of individuals positively affected their supplement use behaviours. This shows that information and education programmes play an important role in the acquisition of healthy eating habits (Table 5).

In our study, it was found that female students used multivitamin/mineral and vitamin B12 more than male students (Table 4). Similarly, in a study conducted in Canada in 2015, it was reported that women used vitamin-mineral supplements at higher rates than men (Keshavarz et al., 2021)

Our finding that individuals with chronic diseases use iron and folic acid supplements (Table 4) more frequently is also consistent with the literature. In the EPIC-Heidelberg cohort study, it was revealed that individuals who defined themselves as hyperlipidaemic were more regular vitamin-mineral users (Li et al., 2010). The study of Vatanparast et al. (2010) also states that chronic diseases are an important factor affecting supplement use. It is also consistent with the research indicating students who did not get information on nutrition had statistically significant deficiencies in their understanding of supplement content. The study of Vatanparast et al. (2010) showed that higher education level had a positive relationship with vitamin-mineral supplement use.

In our study, dieting did not have a significant effect on supplement use (Table 4). However, this result varies in the literature. For example Horst & Siegrist (2011) reported that healthy eating habits were associated with supplement use, but some users also took supplements to compensate for unhealthy diets. Similarly, Block et al. (2007) found that people who followed a healthy diet used more supplements, suggesting that diet may be a motivating factor for supplement use. This difference may be explained by the fact that the sample consisted of young university students and their motivations for dieting may be different.

In our study, it was observed that students who did not take nutrition courses had insufficient knowledge about the content of supplements (Table 5). A 2015 meta-analysis supports that individuals with nutrition education tend to use supplements more consciously (Angelo et al., 2015).

### Conclusion

To sum up, this study investigated university students' knowledge and attitudes toward the use of vitamin and mineral supplements. The findings reveal that most students use supplements primarily to protect and improve their health, although the overall prevalence of supplement use remains relatively low. The most common products used were vitamin B12 and iron, often related to addressing anemia problems. Importantly, students with higher knowledge levels demonstrated more conscious and informed supplement use, while gender, dieting status, and BMI showed no significant influence.

From a broader perspective, the study highlights the crucial role of nutrition education in shaping conscious supplement use. Raising awareness and improving nutrition literacy among young adults is not only important for preventing vitamin and mineral deficiencies but also for fostering sustainable healthy eating behaviors that extend into adulthood. Gaining healthy dietary habits at an early age can help reduce the risk of diet-related chronic diseases such as obesity, cardiovascular disease, diabetes, and osteoporosis later in life.

In this respect, the contribution of the study to science lies in developing and validating reliable measurement tools (VMKS and VMTS) that can be used in future research to assess knowledge and attitudes about dietary supplements. Socially, the study provides guidance for educational programs and public health strategies aiming to promote healthy nutrition practices among university students, ensuring long-term benefits for both individual

and community health.

### Limitations

This study is limited to Ardahan University students and the results may not be generalisable to populations with different demographic characteristics; furthermore, since the data is based on self-report, there is a possibility of bias in the participants' responses.

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