



Nutritional knowledge of Jordanian sports supplement users: a cross-sectional study

Conocimiento nutricional de usuarios de suplementos deportivos en Jordania: un estudio transversal

Authors

Ali Qoqazeh¹
Sameeha Thnaibat²
Moawiya A. Haddad¹
Wesal Alraei³
Fajer Al -Aittan²
Eman Omar Alhasan^{4*}

¹ Independent Researcher (Jordan)

² Middle East University (Jordan)

³ Al Al-Bayt University (Jordan)

⁴ Independent Researcher (Jordan)

Corresponding Author:
Eman Omar Alhasan
emanalhasan27790@gmail.com

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Abstract

Introduction: Adequate nutrition knowledge is essential for informed dietary supplement use and safe sports nutrition practices. This study assessed nutrition knowledge, supplement use patterns, and factors influencing supplement intake among Jordanian dietary supplement users.

Methods: A cross-sectional study included 400 dietary supplement users from four Jordanian governorates. Data were collected using the validated Arabic Abridged Nutrition for Sport Knowledge Questionnaire and a survey on supplement use and sociodemographic characteristics.

Results: Whey protein (49.8%) and creatine (27.3%) were the most commonly used supplements, primarily for muscle gain. Most participants demonstrated poor general nutrition knowledge (39.4%) and poor sports nutrition knowledge (81.0%), with only 3.0% achieving a good sports nutrition knowledge score. Higher nutrition knowledge was significantly associated with age, education, income, and smoking status, while sports nutrition knowledge was also associated with sex.

Conclusions: Jordanian dietary supplement users demonstrated limited sports nutrition knowledge despite widespread supplement use. Targeted nutrition education is needed to promote evidence-based supplement practices.

Keywords

Athletes; Jordan; nutrition knowledge; sports nutrition; sports supplements.

Resumen

Introducción: Un conocimiento adecuado sobre nutrición es esencial para el uso informado de suplementos dietéticos y para unas prácticas seguras de nutrición deportiva. Este estudio evaluó los conocimientos nutricionales, los patrones de uso de suplementos y los factores que influyen en su consumo entre los usuarios de suplementos dietéticos en Jordania.

Métodos: Este estudio transversal incluyó a 400 usuarios de suplementos dietéticos de cuatro gobernaciones jordanas. Los datos se recopilaron utilizando la versión abreviada y validada en árabe del Cuestionario de Conocimientos sobre Nutrición Deportiva, 'Nutrition for Sport Knowledge Questionnaire', así como una encuesta sobre el uso de suplementos y las características sociodemográficas.

Resultados: La proteína de suero (49,8 %) y la creatina (27,3 %) fueron los suplementos más utilizados, principalmente para ganar masa muscular. La mayoría de los participantes demostró un nivel bajo de conocimientos generales sobre nutrición (39,4 %) y de conocimientos sobre nutrición deportiva (81,0 %); solo el 3,0 % obtuvo una buena puntuación en conocimientos de nutrición deportiva. Un mayor nivel de conocimientos nutricionales se asoció significativamente con la edad, el nivel educativo, los ingresos y el hábito de fumar, mientras que los conocimientos sobre nutrición deportiva también mostraron asociación con el sexo.

Conclusiones: Los usuarios jordanos de suplementos dietéticos demostraron tener conocimientos limitados sobre nutrición deportiva, a pesar del uso generalizado de estos productos. Es necesaria una educación nutricional específica para promover prácticas de suplementación basadas en la evidencia.

Palabras clave

Atletas; conocimiento nutricional; jordania; nutrición deportiva, suplementos deportivos.

Introduction

Nutrition education is an effective strategy for improving public nutrition knowledge (NK) (Trakman, 2018a). Proper nutrition plans are vital for sports performance (Hardy et al., 2017; Trakman, 2018a) as they affect training capacity, improve exercise adaptations, promote recovery, enhance immune function (Trakman, 2018a), and contribute to the overall health and wellness of athletes (Werner et al., 2022).

Internationally approved dietary recommendations for athletes provide guidance on optimal nutrient intake, meal timing, and the proper use of fluids and supplements (Trakman et al., 2016).

General nutrition knowledge (GNK) and sports nutrition knowledge (SNK) are essential for promoting healthy dietary behaviours, adequate nutrient intake, and informed nutrition decisions among athletes (Condo, 2019; Heikkilä et al., 2018; Rushe, 2023). Conversely, NK has been identified as a barrier to optimal dietary practices and can negatively affect athletic performance (Werner et al., 2022). Unfortunately, athletes and their coaches often lack NK, which is negatively correlated with athletic performance (Heikkilä et al., 2018).

Most nutritional requirements can typically be fulfilled through a healthy diet. However, athletes often do not meet nutritional recommendations due to insufficient intake of vegetables, fruits, and dairy products (Hardy et al., 2017). Moreover, practical obstacles such as limited time, cooking skills, and financial resources present additional challenges to maintaining healthy dietary practices (Hardy et al., 2017; Heikkilä et al., 2018; Spronk, 2015; Trakman et al., 2016). Consequently, the consumption of sports supplements (SSs) has increased and become widespread among athletes and recreational players, particularly among young athletes across different sports levels (Mera-Zouain, 2022; Salgado et al., 2014).

The variation in supplement prevalence and consumption among countries reflects cultural characteristics and environmental factors that can influence their use (Kofoed et al., 2015). Protein-based products are the most commonly used dietary supplements, serving multiple purposes such as muscle building, recovery, adaptation, energy production, and providing essential micronutrients (Jovanov et al., 2019).

Athletes often believe that supplements contain beneficial ingredients not found in food, viewing them as essential for improving sports performance, such as speed and power production, muscle building, and other factors contributing to athletic success (Elsahoryi et al., 2021; Maughan et al., 2018; Qoqazeh et al., 2024). Misusing supplements can lead to adverse health effects, exposure to prohibited substances, and inadvertent doping (Salgado et al., 2014).

While SSs are generally available over the counter due to less stringent regulation by the Food and Drug Administration (FDA) compared to pharmaceutical products, this increases the risk of product adulteration (Piattoly, 2022). The widespread availability of SSs has raised concerns regarding their safety and appropriate use (Hurst et al., 2023; Petroczi & Naughton, 2008). Limited NK and inadequate guidance from health professionals may further increase these risks (Mera-Zouain, 2022). Furthermore, NK should be assessed using validated instruments capable of identifying specific gaps to facilitate targeted, active, and practical educational interventions (Heikkilä et al., 2018).

Numerous studies in Jordan indicate that despite a high prevalence of supplement use, both athletes and the general population exhibit suboptimal NK (Al-Quran et al., 2023; Amawi et al., 2022; Elsahoryi et al., 2023; Elsahoryi et al., 2021; Yaman & Ibrahim, 2022). This situation may partly reflect the widespread reliance on unreliable sources of nutrition information (Basheer et al., 2021). Understanding these knowledge gaps can help inform targeted nutrition education strategies and promote evidence-based supplement use within this population.

Despite the widespread use of SSs in Jordan, comprehensive evidence regarding both general and sports nutrition knowledge among supplement users remains limited. Moreover, little is known about the relationship between nutrition knowledge, supplement use patterns, and sociodemographic characteristics in this population; therefore, this study aims to assess GNK and SNK among Jordanian SS users, examine the association between NK and selected sociodemographic and lifestyle characteristics, and investigate supplement use patterns, including the types of supplements consumed, reasons for use, and primary sources of supplement-related information.



Method

Study Design

This quantitative, cross-sectional, descriptive-correlational study assessed GNK and SNK among Jordanian adults who consume SSs. It also investigated the association between this knowledge and selected sociodemographic and lifestyle characteristics.

Participants

Eligible participants were healthy Jordanian adults (≥ 18 years) of both sexes who reported consuming SSs. Individuals under 18 years, those with previously diagnosed chronic medical conditions, those who did not provide informed consent, and non-users of SSs were excluded.

The required sample size was calculated using the Raosoft® online sample size calculator (Raosoft, 2004), assuming a 95% confidence level, a 5% margin of error, and a 50% response distribution. According to a study by Qoqazeh and colleagues (Qoqazeh et al., 2024), The prevalence of SS use among Jordanians is 13.75%. Based on the 2024 census by the Jordanian Department of Statistics (Department of Statistics (DoS), 2024). The total population above 18 years old is 7,322,647. Therefore, the estimated number of SS users is 846,929. Given these figures, the required sample size was 384. In this study, 400 participants were recruited to achieve the study objectives.

Procedure

Participants were recruited using convenience sampling through social media platforms (Facebook, WhatsApp, Twitter, Snapchat, and Instagram) and email. Participation was voluntary, and electronic informed consent was obtained from all participants before they accessed the questionnaire. The participants' responses were exported to IBM SPSS Statistics version 26 for analysis and anonymised before statistical analysis.

Instruments

General and sports nutrition knowledge was assessed using the validated Arabic version of the Arabic Nutrition for Sport Knowledge Questionnaire (ANSKQ), developed by Elshahoryi and colleagues (Elshahoryi et al., 2021). This instrument was translated and culturally adapted from the original English ANSKQ (Trakman, 2018b) to evaluate participants' general and sports nutrition knowledge. The Arabic version demonstrated good psychometric properties, including excellent internal consistency (Cronbach's $\alpha = 0.92$), high test-retest reliability (Pearson's $r = 0.926$), and excellent agreement (Cohen's $\kappa = 0.89$) (Elshahoryi et al., 2021).

The questionnaire consisted of three sections. The first section collected demographic and lifestyle information, including age, sex, body weight, height, educational level, monthly income, smoking status, exercise characteristics, SS use, reasons for supplement consumption, and sources of supplement-related information. The second section assessed GNK using nine questions covering nutrient sources, nutrient functions, energy balance, and food sources. The third section assessed SNK with 24 questions on hydration, nutrient recommendations, nutrient timing, evidence-based supplements, supplement labels, banned substances, contamination risks, recovery, and muscle-building nutrition.

During the cultural adaptation process, two alcohol-related questions were removed based on expert recommendations, as they were not appropriate within the Jordanian cultural context.

Ethical Approval

The study protocol was approved by the Institutional Review Board of Al-Balqa Applied University (BAU). The Ethical approval number is (745/1/3/26).

Data Collection and Scoring

Each correct response in the ANSKQ was assigned one point, while incorrect and "don't know" responses received zero points. Total NK scores ranged from 0 to 33, and domain-specific scores were calculated by summing the correct responses, with higher scores indicating greater NK.



Statistical analysis

Study data from the Arabic ANSKQ were analysed in SPSS 26.0. Demographic categorical variables were reported as frequencies and percentages. Total knowledge scores were converted to percentages, averaged, and classified as poor ($\leq 49\%$), moderate (50–65%), good (66–75%), or excellent ($>75\%$) based on reference (25). Normality of continuous variables was assessed using the Kolmogorov–Smirnov and Shapiro–Wilk tests. Homogeneity of variance was evaluated using Levene's test before conducting independent-samples t-tests and one-way ANOVA. Since all variables showed non-significant results ($P > 0.05$), indicating a normal distribution, parametric statistical tests were applied. Two-tailed t-tests and one-way ANOVA were applied to continuous variables to assess differences in mean nutrition and SNK scores across demographic groups. Chi-square (χ^2) was used to evaluate whether there were statistically significant differences between the GNK and SNK categories across participants' demographic variables. Categorical variables were presented as numbers and percentages. Statistical significance was established at $p \leq 0.05$. Multinomial logistic regression was used to examine the effect of demographic characteristics on GNK and SNK and to investigate which demographic characteristics affect the supplement type used, reporting p-values, odds ratios, and 95% confidence intervals, with $p \leq 0.05$ indicating significance.

Results

Demographic Characteristics

A total of 400 present supplement users were included in the current study. Most respondents were aged 31–50 years (46.0%), were male (70.0%), had an education above high school (89.8%), and resided in the central region of Jordan (97.0%). The most popular monthly income category was 400–800 JOD (37.2%), and 39.3% reported tobacco use.

Differences in general and sport nutrition knowledge among demographic participants

The mean GNK score varied significantly by age group, education level, income level, and smoking status ($P < 0.05$), but not by sex or region of residence ($P > 0.05$). Respondents aged 31–50 years had the highest GNK score, whereas those with an income above 1500 JOD had the lowest mean score. GNK was also lower among smokers than non-smokers.

SNK indicated significant differences by age, sex, education level, income level, and tobacco use ($P < 0.05$), but not by region of residence ($P > 0.05$). Men had higher mean SNK than women, and respondents aged 31–50 years showed the highest scores among age groups. Higher SNK was detected among respondents with income between 800 and 1500 JOD, while smokers had lower scores than non-smokers.

Table 1. Demographic and socioeconomic characteristics of the study participants and univariate analysis of the influence of factors on the mean of the general nutrition knowledge score and sport nutrition knowledge score obtained on the ANSKQ (n=400).

Variable	Group	All participants n (%)	GNK	p-value	SNK	p-value
			Mean $\pm$ SD		Mean $\pm$ SD	
Age Group	18–30	167 (41.8)	5.9 $\pm$ 1.8	0.006*	5.5 $\pm$ 1.6	0.000*
	31–50	184 (46)	6.6 $\pm$ 1.7		6.2 $\pm$ 1.5	
	51+	49 (12.2)	6.2 $\pm$ 1.9		6.0 $\pm$ 1.4	
Sex	Male	280 (70)	6.1 $\pm$ 1.7	0.144	6.3 $\pm$ 1.6	0.001*
	Female	120 (30)	6.5 $\pm$ 1.8		5.7 $\pm$ 1.5	
Education level	$\leq$ High School	41 (10.2)	5.8 $\pm$ 1.9	0.000*	5.8 $\pm$ 1.6	0.009*
	$>$ High School	359 (89.8)	6.0 $\pm$ 1.8		6.2 $\pm$ 1.5	
Income level (JOD)	$<$ 400	104 (26)	6.6 $\pm$ 1.7	0.000*	5.5 $\pm$ 1.5	0.000*
	400–800	149 (37.2)	6.9 $\pm$ 1.6		5.9 $\pm$ 1.5	
	800–1500	111 (27.8)	6.4 $\pm$ 1.7		6.4 $\pm$ 1.4	
	$>$ 1500	36 (9)	5.3 $\pm$ 1.9		6.6 $\pm$ 1.3	
Region of residence	Center	388 (97)	6.4 $\pm$ 1.8	0.886	6.1 $\pm$ 1.5	0.920
	North	12 (3)	6.3 $\pm$ 1.8		6.0 $\pm$ 1.7	
Tobacco use	Yes	157 (39.3)	6.0 $\pm$ 1.8	0.004*	6.2 $\pm$ 1.6	0.048*
	No	243 (60.7)	6.6 $\pm$ 1.6		5.8 $\pm$ 1.5	

Categorical variables are shown as numbers and percentages. *Statistical significance was established at $p \leq 0.05$. Differences between the two categories were analysed by performing the independent t-test performed to compare intervention categories according to sex,



education level and tobacco use. While differences among more than two categories were analysed using one-way ANOVA, performed to compare intervention categories according to age, income level, and region.

ANSKQ: Abridged Nutrition for Sport Knowledge Questionnaire. GNK: General nutrition knowledge. SNK: Sports nutrition knowledge

Levels of General and Sport Nutrition Knowledge among Participants

Based on the grouped knowledge levels, as shown in Table 2, 39.4% of respondents had poor GNK, 18.8% had average GNK, 24.0% had good GNK, and 17.8% had excellent GNK. For SNK, 81.0% of participants were classified as poor, 16.0% as average, and 3.0% as good, with no respondents reaching the excellent score category.

The distribution of knowledge levels across sociodemographic characteristics and lifestyle factors is summarized in Table 3. GNK varied significantly according to age, sex, income, region of residence, and tobacco use, while sports nutrition knowledge was connected only with sex, income, and tobacco use. Across all sociodemographic characteristics and lifestyle factors, poor SNK remained highly predominant.

Table 2. Distribution and cut-off of the knowledge mean percentage of participants according to general and sports nutrition knowledge levels

Knowledge Level	Cut-off of the knowledge mean percentage	General nutrition	Sport nutrition
Poor	Between 0 and 49%	158 (39.4)	324 (81)
Average	Between 50 and 65%	75 (18.8)	64 (16)
Good	Between 66 and 75%	96 (24%)	12 (3)
Excellent	Above 75%	71 (17.8)	0 (0)

The knowledge is categorised based on the total meaning of GNK and SNK of all questions.

Table 3. Association between sociodemographic characteristics and nutrition knowledge levels.

Characteristics	Categories	GNK				p-value	SNK			p-value
		Poor n= 158 (39%)	Average n= 75 (18.8%)	Good n = 96 (24%)	Excellent n= 71 (17.8%)		Poor n= 324 (81%)	Average n= 64 (16%)	Good n = 12 (3%)	
Age Group	18-30 years	71 (42.51)	34 (20.36)	45 (26.95)	17 (10.18)	0	132 (79.04)	29 (17.37)	6 (3.59)	0.479
	31-50 years	59 (32.07)	31 (16.85)	46 (25)	48 (26.09)		148 (80.43)	30 (16.3)	6 (3.26)	
	51-70 years	28 (57.14)	10 (20.41)	5 (10.2)	6 (12.24)		44 (89.8)	5 (10.2)	0 (0)	
Sex	Male	117 (41.79)	29 (10.36)	81 (28.93)	53 (18.93)	0	221 (78.93)	53 (18.93)	6 (2.14)	0.02
	Female	41 (34.17)	46 (38.33)	15 (12.5)	18 (15)		103 (85.83)	11 (9.17)	6 (5)	
Education level	High school or below	18 (43.9)	12 (29.27)	5 (12.2)	6 (14.63)	0.121	35 (85.37)	6 (14.63)	0 (0)	0.465
	University degree*	140 (39)	63 (17.55)	91 (25.35)	65 (18.11)		289 (80.5)	58 (16.16)	12 (3.34)	
Income level (JOD)	Less than 400	53 (50.96)	40 (38.46)	5 (4.81)	6 (5.77)	0	92 (88.46)	6 (5.77)	6 (5.77)	0.002
	400-800	58 (38.93)	18 (12.08)	56 (37.58)	17 (11.41)		120 (80.54)	29 (19.46)	0 (0)	
	800-1500	23 (20.72)	17 (15.32)	29 (26.13)	42 (37.84)		82 (73.87)	23 (20.72)	6 (5.41)	
	More than 1500	24 (66.67)	0 (0)	6 (16.67)	6 (16.67)		30 (83.33)	6 (16.67)	0 (0)	
Region of residence	Central region (Amman, Zarqa, etc.)	158 (40.72)	75 (19.33)	90 (23.2)	65 (16.75)	0	312 (80.41)	64 (16.49)	12 (3.09)	0.234
	Northern region (Irbid, Mafrqa, etc.)	0 (0)	0 (0)	6 (50)	6 (50)		12 (100)	0 (0)	0 (0)	
Tobacco use	Yes	64 (40.76)	24 (15.29)	51 (32.48)	18 (11.46)	0.004	127 (80.89)	30 (19.11)	0 (0)	0.048
	No	94 (38.68)	51 (20.99)	45 (18.52)	53 (21.81)		196 (80.99)	34 (14.05)	12 (4.96)	

Categorical variables are shown as numbers and percentages. * Statistical significance was established at $p \leq 0.05$. Relations between the nutrition knowledge categories and demographic characteristics were analyzed by performing the chi-squared test. ANSKQ: Abridged Nutrition for Sport Knowledge Questionnaire. GNK: General nutrition knowledge. SNK: Sports nutrition knowledge.

Primary Sport Participation

The results indicate that 5.5 % of the respondents identified themselves as professional athletes, while 83.2% identified themselves as non-professional athletes, and 11.3 % did not participate in any sport. The most popular sport among the respondents was bodybuilding (weightlifting) at 56.0%, followed by football at 10.3%, running at 7.0%, and swimming at 3.8%. A significant number of respondents, 11.3%, did not participate in any sport. Most of the participants had been involved in sports 3-5 times/week



(59.80%) for 2-3 years (32%), followed by 4-9 years (24%), including medium-intensity exercise level (58.50%).

Supplement usage, purpose, source of supplement knowledge, and association among supplement usage, sociodemographic participants, and knowledge categories achieved on the Arabic Abridged Nutrition for Sport Knowledge Questionnaire (ANSKQ).

Whey protein was the most commonly used supplement (49.8%), followed by creatine (27.3%), as shown in Table 4; all other dietary supplements were used by reasonably small proportions of respondents. In univariate and multivariate investigations, supplement kind was not significantly correlated with either GNK category or SNK score category, and none of the sociodemographic factors independently predicted knowledge levels ($P > 0.05$).

Table 4. Association among supplements usage, lifestyle characteristics of participants, sociodemographic, and knowledge categories achieved on ANSKQ.

The most common supplements used	General nutrition knowledge levels					Sport nutrition knowledge levels				
	Total (N)	POOR	AVERAGE	GOOD	Total (N) P-value	POOR	AVERAGE	GOOD	P-value	
Whey protein	199 (49.8%)	78	35	51	35	0.826	161	33	5	0.976
Creatine	109 (27.3%)	41	21	27	20		87	18	4	
EAA	4 (1.0%)	3	1	0	0		4	0	0	
Omega 3	19 (4.8%)	7	5	2	5		15	3	1	
Multivitamins	6 (1.5%)	3	0	3	0		5	1	0	
Zink	10 (2.5%)	5	2	1	2		8	2	0	
Magnesium	6 (1.5%)	3	1	1	1		5	1	0	
Vitamin D	11 (2.8%)	2	4	4	1		10	1	0	
Caffeine	5 (1.3%)	2	1	2	0		4	1	0	
Vegan protein	4 (1.0%)	0	1	2	1		4	0	0	
BCAA	12 (3.0%)	7	1	1	3		10	1	1	
Hydation and Sport drink	2 (0.5%)	1	0	1	0		2	0	0	
Collagen	6 (1.5%)	4	1	0	1		4	2	0	
Carbohydrate supplement	2 (0.5%)	1	0	1	0		1	1	0	
Sports foods (Protein bar, low-fat chips, etc.)	5 (1.3%)	1	2	0	2		4	0	1	
Total	400 (100%)	158	75	96	71		324	64	12	

Categorical variables are shown as numbers and percentages. * Statistical significance was established at $p \leq 0.05$. Relations among the categories were analysed by performing the chi-squared test. ANSKQ: Abridged Nutrition for Sport Knowledge Questionnaire.

Correlations of general and sport nutrition knowledge with participants' variable characteristics

In Table 5, age, income and tobacco use were the only significant predictors of excellent GNK ($P < 0.05$). Compared with respondents aged 51–70 years, those aged 18–30 years had higher odds of excellent GNK, as did those aged 31–50 years. Respondents with a monthly salary between 800 and 1500 JOD also had higher odds of excellent GNK than those getting more than 1500 JOD. Tobacco users had significantly higher odds of excellent GNK than non-users. The variables of sex, education level, and region of residence were not significantly associated with excellent GNK. Sex, education level, income level, region of residence, and smoking were not significant predictors of SNK in the model.

Table 5. The correlations between general nutrition knowledge among users and ' demographic data of participants.

Variable	Excellent general nutrition knowledge					Good sport nutrition knowledge				
	P-value	B	Odd ratio	95% CI Lower	95% CI Upper	P-value	B	Odd ratio	95% CI Lower	95% CI Upper
Intercept	0.986	15.73	1.77	1.11	6.01	0.974	-98.34	2.01	0.12	0.534
Age group (Ref= 51-70 years)										
18-30 years	0.036	1.32	3.77	1.09	12.99	0.993	15.31	4467	0	6.95
31-50 years	0.014	1.32	3.74	1.31	10.68	0.993	15.57	5835	0	3.01
Sex (Ref= Female)										
Male	0.201	0.549	1.73	0.747	4.01	0.993	-0.006	0.994	0.24	4.11
Education level (Ref= University Degree)										
High school or below	0.588	-0.342	0.71	0.206	2.45	0.994	16.69	1777	1777	1777
Income level (JOD) (Ref= More than 1500)										
Less than 400	0.008	-2.37	0.093	0.016	0.533	0.994	16.31	1217	0	2.01



400-800	0.364	-0.575	0.563	0.162	1.95	0.989	-39.03	1.11	0	0.92
800-1500	0.002	1.74	5.7	1.91	17.03	0.994	16.12	1005	0	9.36
Region of residence (Ref = Northern Region (Irbid, Mafrqa, etc.))										
Central Region (Amman, Zarqa, etc.)	0.983	-19.33	4.03	0	0.734	0.994	2.68	14.69	14.69	14.69
Tobacco use (Ref = No)										
Yes	0.016	0.836	2.31	1.17	4.54	0.972	14.46	1916	0	1.123

*The reference category is poor.

Discussion

This study is the first, to our knowledge, to comprehensively assess both GNK and SNK among SS users in Jordan. The findings demonstrate that although SS are widely used, participants exhibited limited knowledge, particularly regarding sports nutrition. Moreover, demographic factors were associated with GNK, whereas SNK remained consistently low across participant groups, highlighting a widespread knowledge gap.

The overall level of NK observed in this study is concerning. Approximately two-fifths of participants revealed poor GNK, while more than four-fifths had poor SNK. These outcomes are aligned with previous research conducted in Jordan and other Middle Eastern countries, reporting inadequate NK among athletes and dietary supplement users (Al-Quran et al., 2023; Amawi et al., 2022; Elshoryi et al., 2021; Qoqazeh et al., 2024; Vázquez-Espino, 2022). Similarly, poor SNK has also been reported among Jordanian nutrition specialists (Qutob, 2026), suggesting that insufficiencies extend beyond players themselves. International studies have shown relatively higher levels of NK in some populations, including Syrian athletes, among whom nearly 40% demonstrated adequate NK (Finamore et al., 2022; Maad et al., 2024). Together, these findings suggest that nutrition education remains inadequate among dietary supplement users in Jordan and highlight the necessity for structured educational programs based on current scientific evidence.

Although almost 90% of participants had a university education, this may inconsistently reflect SNK. Similar findings have been reported elsewhere, indicating that formal education alone does not necessarily improve SNK or promote evidence-based dietary supplement practices (Balaravi et al., 2017; Maad et al., 2024). This inconsistency may reflect the limited incorporation of sports nutrition into higher education curricula and the continued dependence of athletes on coaches and informal information sources rather than qualified nutrition specialists.

Regression analysis identifies several independent predictors of GNK. Younger and middle-aged adults were more likely to demonstrate higher levels of NK than participants older than 50 years. Similar age-connected trends have been detected in Syria, where growing exposure to health information and greater engagement in physical activity were related to enhanced nutrition awareness (Maad et al., 2024). Participants with higher income also demonstrated greater NK, which is consistent with previous studies suggesting that higher socioeconomic status enables access to nutrition education, professional counselling, and evidence-based health information (Jovanov et al., 2019; Sekulic et al., 2019). Interestingly, smokers showed higher odds of good GNK. Although this outcome appears paradoxical, previous studies have suggested that tobacco users may actively seek health-related information or dietary supplements in an attempt to compensate for perceived health risks (Basheer et al., 2021; Maad et al., 2024). Nevertheless, greater knowledge does not necessarily translate into healthier behaviours, particularly when information is obtained from unreliable sources.

In contrast, none of the studied demographic variables independently predicted SNK. This result suggests that SNK is consistently insufficient regardless of age, sex, educational attainment, or monthly income. Similar concerns have been raised in previous Jordanian studies, which acknowledged inadequate education concerning evidence-based sports nutrition among both athletes and coaches (Al-Quran et al., 2023; Amawi et al., 2022). International evidence also indicates that athletes habitually overestimate their knowledge while relying on peers, social media, and commercial advertising rather than scientifically authorized recommendations (Trakman et al., 2016). Collectively, these findings show that enhancing general health knowledge alone is unlikely to address insufficiencies in SNK and that dedicated sports nutrition education programs are needed.



Protein supplements, mainly whey protein, were the most often consumed supplements in the current study, consistent with international findings identifying protein supplements as the main products used by recreational and competitive sportspersons (Sekulic et al., 2019; Wardenaar, 2016). Creatine was the second most commonly reported supplement, while evidence-based dietary supplements such as vitamin D and omega-3 were used less commonly. This pattern recommends that supplement selection is mainly driven by perceived muscle-building benefits.

Despite these variances in supplement consumption, supplement type was not significantly associated with either GNK or SNK. This result suggests that supplement choice may be influenced more powerfully by external reasons than by nutrition literacy itself. Previous research has consistently recognized advertisements, coaches, peers, and social media as major determinants of supplement use (Jovanov et al., 2019; Maad et al., 2024; Sekulic et al., 2019). Indeed, coaches represented the major source of supplement information in the current study, whereas relatively few participants consulted nutrition specialists. Although coaches play a vital role in athlete progress, previous research has recognized that they often lack formal education in sports nutrition (Basheer et al., 2021; Massad et al., 1995). Consequently, reliance on non-professional information sources may contribute to unsuitable supplement practices and increase the risk of adverse health consequences or unintentional doping.

Collectively, the results indicate that sports supplement use among Jordanian adults is not essentially supported by adequate NK. These findings suggest the need for evidence-based educational approaches targeting athletes, coaches, fitness trainers, and SS users. Educational plans should emphasize proper indications, dosage, timing, efficacy, and possible risks of sports supplements while encouraging consultation with a qualified nutritionist. In parallel, strengthening regulatory oversight of SSs in Jordan may increase consumer safety and decrease misinformation, as suggested by previous studies (Maad et al., 2024; Wardenaar, 2016).

Limitations and Future Directions

The present study has numerous limitations. First, its cross-sectional study precludes establishing causal relationships among demographic characteristics, NK, and supplement use. Second, participants were recruited by convenience sampling, which may limit the generalizability of the outcomes to all SS users in Jordan. Third, all data were self-reported and therefore may be subject to memory bias and social desirability bias. Finally, the study evaluated the types of SS used but did not gather information concerning dosage, frequency, adherence, and factors that may have an additional impact on supplementation practices.

Future research studies should assess the effectiveness of targeted nutrition education programs designed for athletes and coaches. Prospective and intervention studies are also required to determine whether enhancing NK results in more suitable supplement use and better health and performance results. Moreover, future research should examine SS dosage, duration of use, and long-term health effects to offer a more comprehensive understanding of sports supplement practices among users.

Conclusions

This study provided the first comprehensive assessment of both GNK and SNK among Jordanian sports supplement users and identified important knowledge gaps and factors associated with nutrition knowledge. Although most members were university-educated, SNK was particularly poor, and GNK varied by age, income, and tobacco use. These results suggested that formal education alone is not adequate to guarantee adequate sports supplement-related knowledge, and that practical nutrition literacy remained limited in this population.

The findings also display that supplement use was primarily focused on whey protein and creatine, while information was obtained mainly from coaches rather than qualified nutrition specialists. This pattern raised concerns because supplement choices may be driven more by informal guidance than by evidence-based recommendations. These findings support strengthening the role of nutritionists in gyms, sports clubs, and community settings, which may improve the safe and evidence-based use of SSs.

Overall, the current study supported the need for targeted educational programs for athletes and SS users in Jordan, with particular emphasis on sport nutrition recommendations, SS safety, and proper



use. Future studies should include larger, nationally representative samples, longitudinal or intervention designs, and multivariable analysis to better identify independent predictors of nutrition knowledge and supplement use.

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Author Affiliations

Ali Qoqazeh¹, Sameeha Thnaibat², Moawiya A. Haddad¹, Wesal Alraei³, Fajer Al-Aittan², Eman Omar Alhasan^{4*}

1 Independent researcher in Nutrition and Food Processing, Al-Balqa Applied University, Al-Salt, Jordan

2 Department of Nutrition and Integrative Health, Faculty of Allied Medical Sciences, Middle East University, Amman, Jordan

3 Department of Nutrition and Dietetics, Faculty of Applied Medical Sciences, Al al-Bayt University, Mafrq, Jordan

4 Independent Researcher in Human Nutrition and Dietetics, Amman, Jordan

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Authors and translators' details:

Ali Qoqazeh
Sameeha Thnaibat
Moawiya Haddad
Wesal Alraei
Fajer Al-Aittan
Eman Alhasan

Aliqoqazeh4@gmail.com
s.thnaibat@meu.edu.jo
haddad@bau.edu.jo
dr.wesalalraei@aabu.edu.jo
f.alaittan@meu.edu.jo

Author
Author,Translator
Author,Translator
Author
Author
Author

