General and sports nutrition knowledge among nutritionists in Jordan

Conocimiento general y de nutrición deportiva entre los nutricionistas en Jordania

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Abstract

Introduction: Nutrition knowledge is crucial for enhancing athletes' performance, yet few studies have examined general and sports nutrition knowledge among nutritionists.
Objective: To assess general nutrition knowledge (GNK) and sports nutrition knowledge (SNK) among Jordanian nutritionists and their association with sociodemographic and lifestyle factors.
Methodology: A cross-sectional study used a validated questionnaire with 394 convenience-sampled participants. Appropriate statistical tests and multinomial logistic regression (SPSS v26) were applied.
Results: 6.3% of participants had poor GNK and 39.6% had poor SNK. Lower GNK was seen in males and those with diploma/bachelor's versus females and higher-educated individuals (P = 0.022, P = 0.003). Lower SNK was linked to higher BMI (P = 0.016), diploma/bachelor's (P = 0.001), students with no experience (P = 0.011), and individuals with a lack of regular exercise (P = 0.048).
Discussion: Our results contrast with previous research claiming all specialists have poor GNK but align with studies showing inadequate SNK.
Conclusions: Jordanian nutritionists showed fair GNK but notable SNK gaps, associated with gender, BMI, education, experience, and physical activity.

Keywords

General nutrition; knowledge; nutrition specialist; sports nutrition.

Resumen

Introducción: El conocimiento sobre nutrición es crucial para mejorar el rendimiento de los atletas; sin embargo, pocos estudios han examinado el conocimiento general y el conocimiento en nutrición deportiva entre los nutricionistas.
Objetivo: Evaluar el conocimiento general sobre nutrición (GNK) y el conocimiento en nutrición deportiva (SNK) entre los nutricionistas jordanos y su asociación con factores sociodemográficos y de estilo de vida.
Metodología: Se realizó un estudio transversal utilizando un cuestionario validado con 394 participantes seleccionados por conveniencia. Se aplicaron pruebas estadísticas apropiadas y regresión logística multinomial (SPSS v26).
Resultados: El 6.3 % de los participantes presentó un GNK bajo y el 39.6 % un SNK bajo. Se observó un GNK menor en hombres y en aquellos con diploma o licenciatura en comparación con mujeres y personas con mayor nivel educativo (P = 0.022; P = 0.003). Un SNK menor se asoció con un IMC más alto (P = 0.016), diploma o licenciatura (P = 0.001), estudiantes sin experiencia (P = 0.011) y personas que no realizan ejercicio regularmente (P = 0.048).
Discusión: Nuestros resultados contrastan con investigaciones previas que afirmaban que todos los especialistas presentan un GNK bajo, pero se alinean con estudios que muestran un SNK insuficiente.
Conclusiones: Los nutricionistas jordanos mostraron un GNK aceptable, pero con brechas notables en SNK, asociadas con el género, el IMC, la educación, la experiencia y la actividad física.

Palabras clave

Nutrición general; conocimiento; especialista en nutrición; nutrición deportiva.

Introduction

Nutrition in general is a key strategy to ensure adequate nutrition for athletes (Condo et al., 2019). Lack of nutrition knowledge (NK) is a current obstacle to athletes achieving an optimal diet (Werner et al., 2022). Exercise nutrition is an appropriate term for this specialty because it highlights the close connection between the educational fields of nutrition information and exercise physiology (Black, 1999).

Sports nutrition, also known as exercise nutrition, involves the use of dietary elements to enhance training factors, support muscle recovery, improve performance, maintain a healthy weight and body composition, prevent injuries, and strengthen immunity (Trakman et al., 2017). Several studies have indicated that sports nutrition is fundamental to athletic performance. A recent systematic review reported that sport nutrition strategies – including adequate carbohydrate intake, optimal hydration, and the use of some supplements – play a crucial role in enhancing the performance of badminton athletes (Hidayat et al., 2024).

Although nutrition knowledge (NK) is a key determinant of dietary behavior, several studies revealed that athletes' diets remain inadequate and are often deficient in healthy food choices, particularly vegetables, fruits, and dairy products (Hardy et al., 2017; Heikkilä et al., 2018). Athletes with high levels of knowledge tend to eat more vegetables, fruits, and carbohydrates (Condo et al., 2019). Coaches have the greatest influence on athletes, being their trusted source of information about NK, along with parents, social media, and their colleagues (Heikkilä et al., 2018).

Unfortunately, competitors and their coaches appear to have low NK, which adversely influences sports performance (Heikkilä et al., 2018). Moreover, a higher prevalence of supplement use was observed among competitive athletes (Salgado et al., 2014). The prevalence of sports supplements (SS) has expanded across various sports levels and recreational activities (Mera-Zouain et al., 2022), especially within the junior athletes' community, with protein-based items being the most widespread (Jovanov et al., 2019). SS is routinely consumed orally in powder or pill formula, consumed for many purposes, such as muscle growth, maximizing energy and recovery, and adaptation (Qoqazeh et al., 2024).

In addition, previous studies have shown that athletes' dietary intake and nutrition knowledge are related, highlighting the importance of athletes receiving appropriate nutrition education (Rushe & Mullee, 2023).

NK should be assessed using a reliable and valid questionnaire. An approved survey properly recognizes and identifies NK gaps. A questionnaire can be designed to measure nutrition knowledge by converting precise concepts, such as, understanding of certain nutrition concepts. into an organized, testable format (Trakman et al., 2017; Heikkilä et al., 2018). Additionally, sports nutrition knowledge (SNK) can be improved through educational interventions, which may contribute to enhanced athletic performance and overall health (Alkasasbeh Jumah et al, 2025).

To date, no studies conducted in Jordan have assessed the level of sports nutrition knowledge among nutritionists, despite evidence that the Jordanian community frequently obtains nutrition information from unreliable sources (Elsahoryi et al, 2021). Considering the lack of data on Jordanian nutritionists toward general and sports nutrition knowledge, the current study aims to (1) assess the Jordanian nutritionists general and sports nutrition knowledge, (2) evaluate the association between knowledge with various sociodemographic data and lifestyle factors.

Method

Design

The research was conducted using a cross-sectional study design. Data were collected using a validated and reliable self-administered questionnaire (Elsahoryi et al., 2021), as explained below in the section of the study instrument, translated and derived from a valid and reliable English version (Trakman, et al., 2018-a). This cross-sectional approach was designed to provide a comprehensive overview of the participants' current knowledge at a specific point in time. Also, this design was deemed suitable as it permits a well-organized set of standardized and quantifiable data from diverse participants within a

limited time period, providing valuable descriptive and analytical perception without the requirement for follow-up (Kesmodel, 2018; Wang & Cheng, 2020; Maier et al., 2023).

Participants

Due to the lack of reliable data on the total number of nutritionists in Jordan, a sample size of 400 was selected, representing a sufficient and representative subset of the nutritionist community.

A total of 400 subjects had agreed to participate in this study. Being non-nutritionists, only 6 subjects were excluded. A total of 394 participants who were either nutritionists or undergraduate nutrition students aged 18–70 years and living in Jordan, were included in the final analysis. The participants were recruited by a convenience sampling method (a non-probability sampling method).

All participants were informed about the aims and procedures of the study, and their participation was entirely voluntary. Informed consent was obtained electronically through the questionnaire, where respondents confirmed their agreement by selecting the option "Yes, I agree" on the first page. This consent process highlighted confidentiality, anonymity, and the exclusive use of data for research purposes, in accordance with established ethical guidelines.

The inclusion criteria were Jordanian nutritionists who had graduated and fourth year nutrition students, both sexes male and female, aged 18-70 years. The exclusion criteria included nutrition students in their first three academic years, individuals who were not nutritionists, and participants who did not provide informed consent.

The sample size was estimated using a single-proportion formula with a 95% confidence level ($\alpha = 0.05$), an assumed response proportion (p) of 50%, and a margin of error (e) of 5%. The sample size (n) was calculated using the formula: $n = z^2 \times p \times (1 - p) / e^2$, where $z = 1.96$. Substituting these values yielded a required sample size of 384 participants. Based on representative sample size recommendations for large populations using Cochran's equation (Bartlett et al., 2001), the target sample size was rounded up to 400 participants to account for potential non-response and ensure adequate representation of the Jordanian population.

Procedure

The study was reviewed and approved by the Institutional Review Board of the Faculty of Allied Medical Sciences at Applied Science Private University (AMS-2025-13).

The questionnaire was prepared using Google forms and was distributed to study participants through various online platforms; e-mail and social media (Snapchat, Twitter, Facebook, and WhatsApp).

Instruments

Two bilingual Arabic and English researchers translated the English questionnaire to the current Arabic version used in this study. Initially, the questionnaire was translated from English to Arabic, then again from Arabic to English, and then the two copies were compared to ensure the correct meaning of the questions.

Additionally, an Arabic ANSKQ copy of the questionnaire was validated for additional psychometrics by a pilot study completed by 30 participants submitting their responses twice within 10 working days, the validity was evaluated by calculating Correlation matrices between the scale items, the reliability was calculated by Cronbach's alpha, Person's r, and Cohen's measurement. The following were the psychometric validation of the Arabic copy: correlation coefficients (r^2) was 0.72, internal consistency (Cronbach's alpha) equals 0.92, test-retest reliability (Pearson (r^2)) was 0.926 and the inter-rater agreement (Cohen's k statistic) was 0.89.

The Arabic version of the questionnaire was validated for accuracy by a panel of five academic lecturers in nutrition. Based on the feedback of nutrition experts, two questions related to alcohol consumption were removed from the general knowledge section, as they were deemed culturally and religiously inappropriate and potentially intrusive to participants' privacy. Following these modifications, the questionnaire was considered clear, aligned with the study objectives, respectful of participants' privacy, and suitable for use in future research.

The English copy was validated via Rasch tests used on 181 participants of players from non-elite soccer and netball clubs in Australia (Trakman et al., 2018-a). The questionnaire has two parts (general and sports nutrition knowledge), which were both appropriate for the Rasch assessment. Test-retest reliability was proven (r = 0.7 to 0.8) and assessed questionnaire validity was demonstrated by using known-group comparisons (p-value < 0.001) (Trakman, et al., 2018-a). Finally, content validity was established through evaluation by a panel of five Arabic academic experts to confirm the final validity of the questionnaire.

Study questionnaire

The questionnaire included a section on demographic data, specifically designed for the target population (i.e., nutritionists). The demographic variables comprised age, sex, body mass index (BMI), university attended, education level, year of undergraduate study, professional license status, work experience, workplace, monthly income, housing situation, smoking habits, health status, exercise intensity and frequency, professional level of exercise, and experience in sports practice.

Part 1 of the questionnaire assessed general nutrition knowledge (GNK) through nine questions, covering topics such as energy and nutrient sources, the role of macronutrients and micronutrients, and energy balance. Part 2 focused on sports nutrition with 24 questions, addressing athletes' hydration and nutrient requirements, optimal nutrient composition and timing of meals for recovery and muscle building, interpretation of supplement nutrition labels, evidence-based use of sports supplements, and the safety considerations related to banned substances and contaminants.

Data analysis

Data analysis was conducted using SPSS software, version 26.0 (SPSS Inc., Chicago, IL, USA). Categorical demographic variables were presented as frequencies and percentages, while continuous data were expressed as mean ± standard deviation (SD). The total knowledge scores were classified following the approach used in a recent study by Elsahoryi et al. (2023). In short, each question was coded as 1 for a correct answer and 0 for an incorrect one. The total score was then calculated by adding all correct responses and converting the result into a percentage. Based on this percentage, scores were categorized as poor (0–39), moderate (40–74), or good (>74). Higher scores indicated better adherence, as they represent a greater number of correct responses.

Statistical analyses were selected according to the normality of the data, which was determined using the Kolmogorov–Smirnov test. The specific test used for each comparison depended on both the data's normality and the number of groups, which is provided in the footnotes of each table. Factors linked to poor GNK and poor SNK were identified using multinomial logistic regression, with the results expressed as odds ratios (ORs) and 95% confidence intervals (CIs). A p-value of less than 0.05 was considered statistically significant.

Results

Table 1 shows the baseline characteristics of the participants. A total of 394 participants were included in the study, with a mean age of 28.7 ± 8 years. The majority of participants were female (86.5%), while males represented only 13.5% of the sample. Most participants were of Jordanian nationality (91.6%), with a small proportion (8.4%) being non-Jordanian. In terms of anthropometric measures, the average height was 162.8 ± 10.2 cm, and the average weight was 64.9 ± 12.6 kg. The calculated BMI was 26.6 ± 4.5 kg/m^2. Based on BMI classification, 4.6%, 56.9%, 28.6%, and 9.9% of the participants were underweight, normal weight, overweight, and obese, respectively. Regarding educational attainment, 6.3% were still students, the majority (79.4%) held a diploma or bachelor's degree, and 14.3% had completed postgraduate studies (Master's or PhD). In terms of university type, 72.8% graduated from governmental universities, whereas 27.2% graduated from private institutions. When considering professional experience, 6.3% were still students, 46% were fresh graduates or had less than two years of experience, 26.6% had between two and five years of experience, 10.2% had between five and ten years, and 10.9% had more than ten years of experience. A professional license from the MOH was held by 39.3%, while 60.7% did not possess such a license. With respect to the participants' workplaces, 46% were employed

in the health sector (hospitals and clinics), 35.4% were self-employed, 7.7% worked in local or international associations or organizations, and 10.9% were teachers. The majority of the participants (62.4%) reported engaging in regular exercise, while 37.6% did not. Regarding smoking habits, 14.5% were smokers, and 85.5% were non-smokers. Knowledge levels were also assessed. For GNK, 6.3% demonstrated poor knowledge, 48% had moderate knowledge, and 45.7% had good knowledge. In comparison, SNK was generally lower: 39.6% had poor knowledge, 56.3% moderate knowledge, and only 4.1% good knowledge.

Table 1. Baseline characteristics of the participants (n=394)

Parameter	Mean ± SD Frequency (%)
Age (Year)	28.7 ± 8
Sex	
Female	341 (86.5%)
Male	53 (13.5%)
Nationality	
Jordanian	361 (91.6%)
Not Jordanian	33 (8.4%)
Height (cm)	162.8 ± 10.2
Weight (Kg)	64.9 ± 12.6
BMI (Kg/m^2)	26.6 ± 4.5
Underweight	18 (4.6%)
Normal weight	224 (56.9%)
Overweight	113 (28.6%)
Obese	39 (9.9%)
Academic Degree	
Student	25 (6.3%)
Diploma/bachelor's degree	313 (79.4%)
Master's/PhD degree	56 (14.3%)
University System	
Government	287 (72.8%)
Private	107 (27.2%)
Years of experience	
University student (No experience)	25 (6.3%)
Fresh graduate/ less than 2 years	181 (46%)
2-5 years	105 (26.6%)
>5-10 years	40 (10.2%)
>10 years	43 (10.9%)
MOH Professional license	
Yes	155 (39.3%)
No	239 (60.7%)
Working place	
Healthcare sector	181 (46%)
Self-employment	139 (35.4%)
Institutional organization	31 (7.7%)
Teaching	43 (10.9%)
Regular physical exercise	
Yes	246 (62.4%)
No	148 (37.6%)
Smoking	
Yes	57 (14.5%)
No	337 (85.5%)
GNK*	
Poor	25 (6.3%)
Moderate	189 (48%)
Good	180 (45.7%)
SNK®	
Poor	156 (39.6%)
Moderate	222 (56.3%)
Good	16 (4.1%)

* GNK: General nutrition knowledge. ®SNK: Sport nutrition knowledge

The association between the level of GNK and participants' demographic, anthropometric, and lifestyle characteristics is presented in Table 2. Participants with poor GNK had a slightly higher mean age (31.4 ± 9.6 years) compared with those with moderate GNK (28.3 ± 8 years) and good GNK (28.7 ± 7.7 years); however, this difference was not statistically significant (p = 0.117). A significant difference was observed with respect to sex (p = 0.022). Among participants with poor GNK, 13.2% were males compared to only 5.3% of females. Conversely, in the moderate GNK group, 54.7% of males and 46.9% of females

were represented, while in the good GNK group, females dominated (47.8%) compared to males (32.1%). Nationality did not show a statistically significant relationship with GNK (p = 0.101). All participants with poor GNK were Jordanian, while both moderate and good GNK groups included Jordanians and non-Jordanians. In terms of BMI, there was no significant association (p > 0.05). The distribution of BMI categories across GNK groups showed that underweight participants were more likely to have good GNK (38.9%), while obesity was more common among those with poor or moderate GNK (12.8% and 53.8%, respectively). A significant association was noted for educational degree (p = 0.003). Students were more likely to have moderate GNK (80%), while participants with postgraduate qualifications (Master's/PhD) were more frequently represented in the good GNK category (55.4%). Those with only a diploma or bachelor's degree were distributed across all GNK levels. The system of university attended (government vs. private) did not significantly influence GNK (p = 0.313). Similarly, years of experience showed no clear trend, although participants with more than 10 years of professional experience were more likely to fall into the moderate or good GNK categories (p = 0.081). Holding a professional license from the Ministry of Health (MOH) was not significantly associated with GNK (p = 0.123). Likewise, the place of work (health sector, self-employment, associations/organizations, or teaching) showed no significant variation across GNK levels (p = 0.566). Lifestyle factors, including regular exercise (p = 0.582) and smoking status (p = 0.797), were not significantly related to GNK. While smokers were slightly more represented in the good GNK group (49.1%) compared to the poor GNK group (7%), this difference did not reach statistical significance.

Table 2. Association between GNK groups and participants' demographic, anthropometric, and lifestyle characteristics

Parameter	GNK			P-value
	Poor	Moderate	Good	
Age (years)	31.4 ± 9.6	28.3 ± 8	28.7 ± 7.7	0.117
Sex Female Male	18 (5.3%) 7 (13.2%)	160 (46.9%) 29 (54.7%)	163 (47.8%) 17 (32.1%)	0.022*
Nationality Jordanian Not Jordanian	25 (6.9%) 0	176 (48.8%) 13 (39.4%)	160 (44.3%) 20 (60.6%)	0.101
BMI Underweight Normal weight Overweight Obese	24.6 ± 4.8 3 (16.7%) 10 (4.5%) 7 (6.2%) 5 (12.8%)	29.4 ± 65.9 8 (44.4%) 101 (45.1%) 59 (52.2%) 21 (53.8%)	24 ± 3.6 7 (38.9%) 113 (50.4%) 47 (41.6%) 13 (33.3%)	0.517 0.088
Academic Degree Student Diploma/bachelor's degree Master's/PhD degree	 1 (4%) 24 (7.7%) 1 (1.8%)	 20 (80%) 144 (46%) 24 (42.8%)	 4 (16%) 145 (46.3%) 31 (55.4%)	0.003*
University System Government Private	 16 (5.6%) 9 (8.4%)	 134 (46.7%) 55 (51.4%)	 137 (47.7%) 43 (40.2%)	0.313
Years of experience University student (No experience) Fresh graduate/ less than 2 years 2-5 years >5-10 years >10 years	 1 (4%) 14 (7.7%) 8 (7.6%) 0 2 (4.7%)	 19 (76%) 84 (64.4%) 43 (41%) 20 (50%) 23 (53.5%)	 5 (20%) 83 (45.9%) 54 (51.4%) 20 (50%) 18 (41.9%)	0.081
MOH Professional license Yes No	 13 (8.4%) 12 (5%)	 80 (51.6%) 109 (45.6%)	 62 (40%) 118 (49.4%)	0.123
Working place Healthcare sector Self-employment Association or organization Teaching	 12 (6.6%) 8 (5.8%) 2 (6.5%) 3 (7%)	 93 (51.4%) 13 (42.4%) 59 (41.9%) 24 (55.8%)	 76 (42%) 72 (51.8%) 16 (51.6%) 16 (37.2%)	0.566
Regular physical exercise Yes No	 10 (6.8%) 15 (6.1%)	 66 (44.6%) 123 (50%)	 72 (48.6%) 108 (43.9%)	0.582
Smoking Yes No	 4 (7%) 21 (6.2%)	 25 (43.9%) 164 (48.7%)	 28 (49.1%) 152 (45.1%)	0.797

P-values are determined by the Chi-squared test and the Kruskal-Wallis test for parametric and non-parametric variables, respectively.
* Bold P-values represent significant results.
*Significant differences, p < 0.05

The multinomial logistic regression analysis for determining factors associated with poor GNK is found in Table 3. Results revealed a significant association between sex and poor GNK. Specifically, males were found to have significantly higher odds of exhibiting poor GNK compared to females, with an OR of 3.822 (95% CI: 1.389 – 10.518, p = 0.009). Regarding the academic degree level, the analysis did not identify a statistically significant association with poor GNK (p > 0.05).

Table 3. Predictors for poor GNK

Parameter	OR	95% CI	P-value
Sex			
Female	1	1.389 – 10.518	0.009*
Male	3.822		
Academic Degree			
Student	9.149	0.466 – 179.781	0.145
Diploma/bachelor's degree	5.491	0.707 – 42.629	0.103
Master's/PhD degree	1		

- Multinomial logistic regression was considered in this table.
- Good GNK is the reference group.
- Abbreviations: CI: Confidence interval, and OR: Odds ratio.
- *Significant differences, p < 0.05

The relationship between SNK and participants' characteristics is presented in Table 4. The mean age was similar across all SNK groups: 28.5 ± 7.7 years among those with poor knowledge, 28.9 ± 8.3 years for moderate knowledge, and 28.4 ± 6 years for good knowledge, with no significant differences (p = 0.816). Sex was not significantly associated with SNK (p = 0.952). In the poor SNK group, 39.3% were females and 41.5% were males. The majority of both sexes clustered in the moderate group (56.6% of females and 54.7% of males), while only a small minority had good SNK (4.1% of females, 3.8% of males). Similarly, nationality showed no significant effect on SNK (p = 0.588). Among Jordanians, 39.1% fell into the poor SNK group, 57.1% into the moderate group, and 3.9% into the good group, while non-Jordanians followed a similar pattern. In contrast, BMI demonstrated a statistically significant association with SNK. Participants with obesity were more represented in the poor SNK category (48.7%) compared to those of normal weight (36.6%) or underweight (16.7%) (p = 0.016). Conversely, individuals with a normal BMI were more likely to fall into the moderate or good SNK categories. Furthermore, underweight participants were disproportionately represented in the good SNK group (22.2%) compared to overweight or obese individuals (p = 0.001). Educational level also showed a strong association with SNK (p = 0.001). The majority of students (64%) had poor SNK, while participants holding a diploma or bachelor's degree (58.5%) and those with a postgraduate qualification (58.9%) were more frequently in the moderate group. A small proportion of participants with higher education (Master's/PhD) achieved good SNK (8.9%). The system of the university attended showed a trend but was not statistically significant (p = 0.076). Participants from governmental universities had similar distributions across SNK groups as those from private universities. A significant association was found for years of professional experience (p = 0.011). Students (64%) were clustered in the poor SNK group, while fresh graduates and those with up to ten years of experience were more often in the moderate category. Interestingly, only a very small fraction across all experience groups fell into the good SNK category, with slightly higher proportions among those with more than five years of experience. Possession of a professional license from the MOH was not significantly associated with SNK (p = 0.151). Likewise, workplace (healthcare sector, self-employment, association/organization, or teaching) did not show significant differences across SNK groups (p = 0.123). However, regular exercise was significantly associated with SNK (p = 0.048). Participants who exercised regularly were more likely to fall into the moderate (58.8%) and good (6.8%) knowledge categories, compared with non-exercisers, who had higher representation in the poor SNK group (42.7%) and lower likelihood of achieving good SNK (2.4%). Smoking status was not significantly associated with SNK (p > 0.05). Smokers and non-smokers were mostly concentrated in the moderate SNK group, with only a minimal percentage showing good knowledge in either category.

The multinomial logistic regression for SNK (Table 5) identified several significant predictors for poor SNK. BMI emerged as a significant positive predictor, with an OR of 1.224 (95% CI: 1.029 – 1.456, p = 0.023). Furthermore, regular exercise was a significant predictor. Individuals who did not engage in regular exercise had significantly higher odds of poor SNK compared to those who did (OR = 3.466, 95%

CI: 1.139 – 10.549, p = 0.029). Finally, degree level also played a significant role in predicting poor SNK. Compared to those with a Master's/PhD degree, individuals with a Diploma/Bachelor's degree had significantly higher odds of poor SNK (OR = 4.368, 95% CI: 1.058 – 18.4, p = 0.042). However, years of experience did not show a statistically significant (p > 0.05) association with poor SNK.

Table 4. Association between SNK groups and participants' demographic, anthropometric, and lifestyle characteristics

Parameter	SNK			P-value
	Poor	Moderate	Good	
Age (years)	28.5 ± 7.7	28.9 ± 8.3	28.4 ± 6	0.816
Sex				
Female	134 (39.3%)	193 (56.6%)	14 (4.1%)	0.952
Male	22 (41.5%)	29 (54.7%)	2 (3.8%)	
Nationality				
Jordanian	141 (39.1%)	206 (57.1%)	14 (3.9%)	0.588
Not Jordanian	15 (45.5%)	16 (48.5%)	2 (6.1%)	
BMI	30.7 ± 12.4	24.1 ± 3.9	22.2 ± 3.2	
Underweight	3 (16.7%)	11 (61.1%)	4 (22.2%)	0.016*
Normal weight	82 (36.6%)	133 (59.4%)	9 (4%)	0.001*
Overweight	52 (46%)	58 (51.3%)	3 (2.7%)	
Obese	19 (48.7%)	20 (51.3%)	0	
Academic Degree				
Student	16 (64%)	6 (24%)	3 (12%)	0.001*
Diploma/bachelor's degree	122 (39%)	183 (58.5%)	8 (2.6%)	
Master's/PhD degree	18 (32.1%)	33 (58.9%)	5 (8.9%)	
University System				
Government	104 (36.2%)	170 (59.2%)	13 (4.5%)	0.076
Private	52 (48.6%)	52 (48.6%)	3 (2.8%)	
Years of experience				
University student (NO experience)	16 (64%)	6 (24%)	3 (12%)	
Fresh graduate/ less than 2 years	71 (39.2%)	104 (57.5%)	6 (3.3%)	0.011*
2-5 years	38 (36.2%)	66 (62.9%)	1 (1%)	
>5-10 years	14 (35%)	22 (55%)	4 (10%)	
>10 years	17 (39.5%)	24 (55.8%)	2 (4.7%)	
MOH Professional license				
Yes	70 (45.2%)	78 (50.3%)	7 (4.5%)	0.151
No	86 (36%)	144 (60.3%)	9 (3.8%)	
Working place				
Healthcare sector	79 (43.6%)	97 (53.6%)	5 (2.8%)	
Self-employment	52 (37.4%)	79 (56.8%)	8 (5.8%)	0.123
Association or organization	7 (22.6%)	24 (77.4%)	0	
Teaching	18 (41.9%)	22 (51.2%)	3 (7%)	
Regular physical exercise				
Yes	51 (34.5%)	87 (58.8%)	10 (6.8%)	0.048*
No	105 (42.7%)	135 (54.9%)	6 (2.4%)	
Smoking				
Yes	19 (33.3%)	37 (64.9%)	1 (1.8%)	0.301
No	137 (40.7%)	185 (54.9%)	15 (4.5%)	

P-values are determined by the Chi-squared test and the Kruskal-Wallis test for parametric and non-parametric variables, respectively.
* Bold P-values represent significant results

Table 5. Predictors for poor SNK

Parameter	OR	95% CI	P-value
BMI	1.224	1.029 – 1.456	0.023*
Regular physical exercise			
Yes	1	1.139 – 10.549	0.029*
No	3.466		
Years of experience			
University student (No experience)	2.765	0.001 - 5787.898	0.794
Fresh graduate/ less than 2 years	0.855	0.129 – 5.671	0.871
2-5 years	3.011	0.232 – 38.991	0.399
>5-10 years	0.35	0.05 – 2.448	0.29
>10 years	1		
Academic Degree			
Student	0.57	0.1 – 1079.947	0.884
Diploma/bachelor's degree	4.368	1.058 – 18.4	0.042*
Master's/PhD degree	1		

- Multinomial logistic regression was considered in this table.
- Good SNK is the reference group
- Abbreviations: CI: Confidence interval, and OR: Odds ratio

Discussion

Sports nutrition is crucial to enhance exercise performance, boost immunity, aid recovery, support adaptation, and protect against injuries. Because little is known about the nutritional knowledge of nutritionists in Jordan, this study set out to evaluate the levels of both their GNK and SNK, and to explore how these are influenced by demographic, anthropometric, and lifestyle factors. The findings showed that 6.3% of participants had poor GNK, while 39.6% had poor SNK. Regression analysis further revealed that male nutritionists were more likely to have lower GNK compared to females. For SNK, a higher BMI, lack of regular physical activity, and holding only a diploma or bachelor's degree were identified as factors associated with poorer SNK. No previous studies have been conducted in Jordan to determine the GNK and SNK among nutritionists; however, the impact of our findings could be reflected on the public, particularly athletes. Furthermore, the current findings can be used to inform policy development and improve academic curriculum.

The observed level of SNK in this study aligns with the study objectives and hypothesis, whereas GNK deviates from the expected results, likely reflecting the absence of mandatory sports nutrition courses in the nutrition programs and dietetic sections in Jordanian universities. Nutrition programs in Jordan primarily emphasize general human nutrition, food science, and clinical nutrition with limited focus on sports nutrition. Moreover, no Jordanian universities offer undergraduate or postgraduate degrees in sports nutrition. Additionally, there is limited support from governmental and private organizations and a lack of a main professional or regulatory body tailored to sports nutrition. Furthermore, training opportunities are inadequate, and job prospects for nutritionists in professional clubs and team sports remain limited.

Our GNK study findings are not consistent with previous studies in the world; a study indicated that all healthcare professionals, including nutritionists, have poor clinical nutrition knowledge, and that increasing the knowledge level of all healthcare professionals plays an essential part in improving clinical nutrition practice (Abdollahi et al., 2013). Another study showed poor dental nutrition knowledge among dietetics and nutrition students (Bapat et al., 2016). European dietitians demonstrated deficiencies in training on sustainable dietary patterns (SDP) and acknowledged the existence of barriers to their development (Muñoz-Martínez et al., 2023). A study in Spain on health care professionals revealed that their nutrition knowledge is not high (Fresán et al., 2023), and highlighted the need for SDP training courses (Fresán et al., 2023; Muñoz-Martínez et al., 2023).

Whereas SNK is consistent with the expected findings, a study conducted among Malaysian university athletes revealed that they have poor SNK (Nor Azizam et al., 2022). Another study in the United States showed inadequate SNK among student-athletes (Andrews et al., 2016).

The GNK and SNK among athletes and coaches in Jordan appear to be notably lacking, which may adversely impacts their dietary practices and sports performance (Elsahoryi et al., 2021). A Scoping review shows that the literature in this field is limited, and there is a need for additional research to reveal the nutritional shortage and dietary intake of athletes (Hopper et al., 2025). Because student athletes face well-known nutrition challenges and dietitians have been shown to effectively improve their dietary outcomes, it is important to conduct more research using stronger methods (Riviere et al., 2021). Nutrition education is crucial in enhancing dietary intake recommendations and nutrition awareness and knowledge among athletes (Valliant et al., 2012). The absence of the right nutrition guidance for both athletes and coaches highlights the need for targeted interventions to upgrade knowledge and practices (Torres-McGehee et al., 2012; Cockburn et al., 2014). Athletes could gain significant benefits from receiving proper nutritional education and training, which would help enhance their understanding, improve their eating habits, and ultimately contribute to better athletic performance (Alahmadi & Albassam, 2023; Sánchez-Díaz et al., 2020). Having low nutrition knowledge puts athletes at risk for inappropriate nutrition choices that could reduce their performance and increase the likelihood of injury (Werner et al., 2022).

Globally, the GNK and SNK of athletes were poor; outcomes were significantly diverse amongst participants (Heikkilä et al., 2018; Trakman et al., 2018-b; Amawi et al., 2022; Werner et al., 2022; Rushe & Mullee, 2023). In Spain and Italy, the nutrition professionals have primitive knowledge to teach children nutrition education (Domínguez-Rodríguez et al., 2023). There is a deficiency of GNK among nutrition students and graduate dietitians. The findings indicate that recreational athletes generally have limited

knowledge about nutrition, particularly those who have not consulted a registered nutritionist or received formal training in nutrition. In Saudi Arabia, athletes and individuals involved in physical activities in Riyadh demonstrate a lack of adequate nutrition knowledge and have suboptimal dietary habits (Alahmadi & Albassam, 2023).

Similarly, in Jordan, many studies showed poor general and sport nutrition knowledge among athletes (Elsahoryi et al., 2021; Amawi et al., 2022; Al-Quran et al., 2023). A recent study reported that most Jordanian sportspeople possessed poor GNK, with significant differences observed across demographic characteristics (Elsahoryi et al., 2021). Furthermore, coaches demonstrated poorer knowledge compared with athletes, indicating a possible gap in the instruction provided to sportspeople (Amawi et al., 2022).

Clinical implications

Our findings supported limited nutrition knowledge among nutritionists. These findings highlight the need for academic institutions and universities to incorporate core sports nutrition courses into nutrition curricula. Furthermore, the development of specialized programs in sports nutrition that align with labor market demands in sports and clinical practice is essential. In addition, integrating continuous professional training - such as workshops, courses, and structured training programs – would strengthen nutrition specialist competencies in sports nutrition field.

Implementing targeted sport nutrition programs and improving nutritionists in SNK can enhance the quality of nutritional services provided to athletes, reduce reliance on non-expert consultants, and promote evidence-based practice in sports. The findings highlight the importance of raising awareness among athletes and sports community about the value of consulting sports nutritionists for accurate and precise dietary guidance.

These outcomes support policymakers, sports agencies and organizations in advocating for the inclusion of professional sports nutritionists within sports clubs, team settings, and national federations. Additionally, this study encourages future research to examine the association between nutritionist knowledge gaps, athletes' performance implications, and public health. Moreover, these findings may create opportunities for future research to develop tools and educational interventions aimed at enhancing sports nutrition knowledge.

Strengths and limitations

This study is the first to assess sports nutrition specialists' knowledge in Jordan, addressing an important scientific gap. It involved a substantial sample size representing the knowledge of nutritionists in Jordan. The questionnaire used was reliable and validated, as employed in a recently published article. Furthermore, the participants were drawn from various labor markets, including hospitals, nutrition centers, online platforms, and gym centers, and from all universities in Jordan, ensuring a representative sample and accurate results.

The cross-sectional study does not determine factors that influence people, or measure how these factors influence them over time, it only evaluates the community at a certain date and time, without revealing cause-and-effect associations. Moreover, because the questionnaire relied on self-reports, some information might not be accurate as responses are subject to bias or overestimation of knowledge. A further limitation is that convenience sampling is a non-randomized method which carries a risk of bias and limited representativeness, making it insufficient to generalize results to all population.

Conclusions

This cross-sectional study was conducted to highlight the gaps in sport nutrition knowledge among nutrition students and professionals in Jordan in providing athletes with evidence-based guidance for individualized nutrition plans that enhance sports performance, support recovery, optimize health and prevent nutrient deficiencies.

The findings highlight substantial gaps in sports nutrition knowledge among Jordanian nutrition specialists, while general nutrition knowledge was found to be fair. Male nutritionists with a diploma or bachelor's degree were more likely to exhibit lower GNK. For SNK, higher BMI, lack of regular physical

activity, limited experience and holding only a diploma or bachelor's degree were associated with poorer SNK. These findings underscore the significance of sports nutrition in Jordan and provide a foundation for future research to further document and address these knowledge gaps.

This study advances the field by providing the first comprehensive assessment of general and sports nutrition knowledge among nutrition professionals in Jordan, highlighting the need for ongoing professional development. Future research should include other healthcare professionals and evaluate the impact of targeted educational interventions on nutrition practices.

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