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A Comparative Study of Sports Nutrition Knowledge among University Female Students, Case-Control Study

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Abstract:

This study aimed to evaluate and compare the level of nutrition knowledge among sports faculty female students and non-sports female students from other faculties. The study recruited 249 female university students—101 sports students from the faculty of Physical Education and 148 non-sports students from different faculties. Students in their third or fourth year, aged 20 to 22, and agreed to participate were enrolled. In contrast, those who had disabilities or mental health issues and had chronic illnesses were excluded. This study used the Nutrition for Sport Knowledge Questionnaire (NSKQ) to assess sports nutrition knowledge. Participants' body height (cm), body weight (kg), and BMI (kg/m2) were measured. The data were statistically analyzed and presented as frequency, percentage, mean, and ±SD. The results showed that sports students exhibited superior performance in weight management compared to non-athletes (P<0.01), but most sports (51.5%) and non-sports (68.3%) students scored below 50.0%. Students in sports (54.5%) and non-sports (65.5%) categories predominantly achieved scores below 50.0% in macronutrients (P<0.05). Most sports students (75.3%) and non-sports students (82.4%) scored below 50.0% in the micronutrient domain. Only two out of the twelve questions regarding sports nutrition were answered correctly. Sports students achieved a higher mean score. Approximately two-thirds of participants responded correctly to one supplement question. Sports students exhibited significantly higher mean NSKQ scores (P<0.05) than non-sports students (38.5±6.8% vs. 36.1±9.0%, respectively). In conclusion, while sports students had more information than non-sports students, their nutrition knowledge was inferior, particularly in micronutrients, sports nutrition, and supplementation.

Keywords: *Athletes, NSKQ, Weight-Management, Nutrition Education, Supplements*

1. INTRODUCTION

Understanding sports nutrition is crucial for athletes' health and performance, as it significantly affects their dietary choices and overall well-being. Research shows that many athletes lack sufficient nutrition knowledge. University students receiving

sports education and expected to continue their professional lives on sport-related fields were determined to have the lack of knowledge on nutrition (1).

A solid foundation in nutrition knowledge is essential for optimal physical health and performance (2). Athletes need personalized nutrition plans to meet their higher energy and nutrient requirements, vital for effective training and recovery (3). Studies indicate improved nutrition knowledge is associated with better dietary practices and enhanced athletic performance (2,4).

Inadequate nutrition can lead to deficiencies that negatively impact physical performance and overall health (5). Athletes with a higher level of nutrition knowledge generally achieve better health outcomes and performance metrics (6).

Coaches play a crucial role in sharing nutrition knowledge; however, many lack sufficient training in sports nutrition (5). Implementing structured nutrition education programs can strengthen athletes' comprehension and application of nutritional principles (2,4).

Inadequate nutrition knowledge can lead to significant problems, including low energy availability (LEA), nutritional disorders, and poor dietary choices. A study found that 53% of female team sport athletes were at risk for LEA, and 70% demonstrated poor nutrition knowledge (7). LEA can result in relative energy deficiency in sports (RED-S), negatively impacting overall health and performance.

Female athletes, especially those in sports who prioritize leanness, often experience high rates of nutritional disorders due to a lack of knowledge. Common issues include anemia, menstrual irregularities, and inadequate bone mineralization, exacerbated by poor dietary habits (8).

Athletes with low nutritional literacy may struggle to make informed dietary choices, leading to inadequate intake of essential nutrients. This deficiency can hinder recovery, energy levels, and overall athletic performance, as athletes may not fully recognize the importance of maintaining a balanced diet (9).

On the other hand, improving nutrition literacy through targeted educational interventions has shown promise in enhancing knowledge and dietary practices among athletes. While low nutrition literacy poses significant risks, proactive education can effectively address these issues (10).

A study on youth football players revealed a low overall nutritional knowledge score, underscoring the need for better education (11). Research has found that many athletes, including female athletes, demonstrate inadequate nutritional knowledge, which can negatively impact their performance and health (12).

While focusing on sports nutrition knowledge is essential, it is also important to recognize that some athletes may

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prioritize performance over nutrition, potentially leading to unhealthy eating habits. This emphasizes the need for a balanced approach integrating nutrition education with performance training. The major objectives of this study were to explore and measure the depth of nutritional knowledge among students in sports faculties, and draw comparisons with the nutritional knowledge of students in other university faculties.

2. Subjects and Methods

2.1 Subjects

This study was conducted on female university students selected from Menoufia University, Shibin El Kom, Egypt. The total sample consisted of 249 students; 101 were sports students (cases) chosen from the Faculty of Physical Education, while 148 were non-sports students (controls) selected from other theoretical faculties. Subjects who met the inclusion criteria were enrolled in the study. Inclusion Criteria: Females students enrolled at Menoufia University in their third and fourth years of academic education, age from 20 to 22 year, and agree to participate and sign the consent form.

While subjects who met the exclusion criteria were not included in the study. Exclusion Criteria: Male students, Participated in nutrition classes exclusively designed for non-athletes, Students with disabilities or mental health issues, and Students suffering from chronic illnesses

2.2 Methods

Research data were collected through a questionnaire and face-to-face interviews.

2.2.1 The Nutrition for Sport Knowledge Questionnaire (NSKQ)

This descriptive study assessed sports nutrition knowledge using the Nutrition for Sport Knowledge Questionnaire (NSKQ) developed by Trakman et al. (13). The NSKQ is a comprehensive tool consisting of 89 questions divided into six sub-sections: weight management, macronutrients, micronutrients, sports nutrition, supplements, and alcohol. The questionnaire has been validated through classical test theory and Rasch analysis, ensuring its reliability and effectiveness in measuring nutrition knowledge. A corrected version of the questionnaire was obtained through direct contact with Dr. Greg Trakman at g.trakman@latrobe.edu.au.

Moreover, the researchers excluded the last section about alcohol as there is no one of the subjects drank any alcohol.

2.2.2 Anthropometric Indices

Body height (cm) was measured to the nearest 0.1 cm using a non-stretchable measuring tape. Body weight (kg) was assessed with a portable scale, accurate to 0.1 kg. Body mass index (BMI) was calculated using height and weight measurements. BMI was used to classify subjects into the following categories: thinness (BMI < 16.5 kg/m²), underweight (16.5-18.5 kg/m²), healthy weight (18.5-25 kg/m²), overweight (25-30 kg/m²),

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obesity grade II (30-35 kg/m²), obesity grade III (35-40 kg/m²), and morbid obesity (BMI ≥ 40 kg/m²).

2.2.3 Statistical Analysis

All obtained data were statistically analyzed and presented as frequency, percentage, mean, and standard deviation (±SD). Significant differences between numeric variables were determined using an independent sample t-test. The Chi-square test and a 95% confidence interval were employed to compare categorical variables. A P value of less than 0.05 indicated statistical significance.

2.2.4 Ethical approval:

All Experiments for this Study were Ethically Approved by the Scientific Research Ethics Committee (Approval No. 14 - SREC- 06 -2022).

3. Results

In the data presented in Table 1, the research sample comprised 249 university students drawn from Menoufia University, Shibin El Kom, Egypt. Among them, 101 were sports students enrolled in the Faculty of Sports, and 148 were non-sports students representing other faculties. Notably, all participants were female, with the predominant age group being 21 years (58.4% for sports students and 54.7% for non- sports students). The average age of the students ranged from 20 to 22 years. Importantly, a substantial percentage of both sports and non-sports students originated from rural areas (53.5% and 67.6%, respectively).

Table 1: General Characteristics and Field of University Study of sports and Non- sports Students

	Sports students	Non-Sports students	Total	P-value
	no (%)	no (%)	no (%)	
Age (year)				
20	3 (3.0%)	8 (5.4%)	11 (4.4%)	0.150 NS
21	59 (58.4%)	81 (54.7%)	140 (56.2%)	
22	39 (38.6%)	59 (39.9%)	98 (39.4%)	
Total	101 (100.0%)	148 (100.0%)	249 (100.0%)	
Residency				
Rural	54 (53.5%)	100 (67.6%)	154 (61.8%)	0.017*
Urban	47 (46.5%)	48 (32.4%)	95 (38.2%)	
Total	101 (100.0%)	148 (100.0%)	249 (100.0%)	

*P value calculated by Chi2 Tests. NS: Not Significant, *P<0.05*

In accordance with Table 2, there were no statistically significant differences in age between students in the faculty of sports and those outside this discipline (21.36±0.54 and 21.49±0.60 years, respectively). However, the body weight and body height of sports students were markedly higher (P<0.05 and <0.01, respectively) at (64.60±9.87 kg and 164.24±5.83 cm, respectively), compared to non-sports students (61.95±9.53 kg and 162.09±5.84 cm, respectively).

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Analysis of BMI categorization revealed that a substantial proportion of sports and non-sports students (60.4% and 68.9%, respectively) exhibited healthy body weight. In contrast, 27.7% of sports students and 24.3% of non-sports students were classified as overweight, while 5.9% of sports students and 4.1% of non-sports students were categorized as having obesity.

Table 2: Anthropometric Measurements of Sports and Non-Sports Students (Mean±SD)

	Sports students (n=101)	Non-Sports students (n=148)	
	Mean±SD	Mean±SD	P-value
Age (year)	21.36±0.54	21.49±0.60	0.062 NS
Body weight (kg)	64.60±9.87	61.95±9.53	0.034 *
Body height (cm)	164.24±5.83	162.09±5.84	0.005**
BMI (kg/m2)	23.94±3.34	23.56±3.32	0.389 NS
BMI classification according to WHO, 2005 (no & %)			
Underweight (BMI: 16.5-18.5)	6 (5.9%)	4 (2.7%)	0.330 NS
Healthy weight (BMI: 18.5-25.9)	61 (60.4%)	102 (68.9%)	
Overweight (BMI: 25:30)	28 (27.7%)	36 (24.3%)	
Obesity II (BMI 30-35)	6 (5.9%)	6 (4.1%)	
Total	101 (100.0%)	148 (100.0%)	

*The p value for numeric variables was calculated using the independent sample t-test, and the P value for string variables was calculated using the Chi2 Tests. NS: Not Significant, *P<0.05, ** P<0.01*

Table 3 illustrates that more than 50% of the respondents answered only five out of twelve weight-related questions accurately. Specifically, 71.3% of athletes and 78.4% of non-athletes correctly responded to question 1.1, which pertains to the nutrient with the highest energy content per 100 grams. Regarding question 1.2.3, which explores the impact of excess protein consumption, 55.4% of athletes and 52.0% of non-athletes provided correct responses. About question 1.3.1, 87.1% of athletes and 83.8% of non-athletes acknowledged that substituting carbohydrates/energy-dense foods with low-energy foods such as vegetables is an effective method for weight loss. Similarly, for question 1.3.2, 77.2% of athletes and 70.9% of non-athletes considered replacing butter with margarine as good practice. Lastly, for question 1.5, about energy requirements, 79.2% of athletes and 74.3% of non-athletes affirmed that all athletes should tailor their diet based on age, gender, body size, sport, and training program.

In the realm of weight-related knowledge, most of the respondents inaccurately answered seven out of twelve questions. The most commonly misconstrued question was 1.3.4: 'Do you think choosing carbohydrates with a lower glycemic index (GI) helps regulate appetite?' A notable 88.8% of respondents answered it incorrectly. The subsequent most frequently misinterpreted question was 1.2.2: 'Do you agree or disagree that eating more

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protein is the most important dietary change if you want to have more muscle?' This was erroneously answered by 84.3% of respondents. Following that was question 1.6: 'Which is a better recovery meal option for an athlete who wants to put on muscle?' This was incorrectly answered by 80.7% of respondents. Questions 1.1, 1.7, 1.2.1, 1.4, and 1.3.3 also exhibited a high percentage of incorrect responses, indicating a substantial knowledge gap.

In the weight management domain, athlete students demonstrated notably higher performance than non-athlete students, reflected in their respective percentages of 45.5% ± 14.8% vs. 39.8% ± 15.1%. This disparity was statistically significant, with a P-value of less than 0.01. It is noteworthy that a majority of both athlete (51.5%) and non-athlete (68.3%) students received scores below 50.0% in this domain.

Table 3: Nutrition for Sports Knowledge of Sports and Non-Sports Students Concerning Weight Management Domain

	Answer	Sports students (n=101)	Non-Sports students (n=148)	Total	P-value
		no (%)	no (%)	no (%)	
Q 1.1 Which nutrient do you think has the most energy (kilojoules/calories) per 100 grams (3.5 ounces)?					
(1) Carbohydrate, (2) Protein, (3) Fat, (4) Not sure	Incorrect	72 (71.3%)	116 (78.4%)	188 (75.5%)	0.130
	Correct	29 (28.7%)	32 (21.6%)	61 (24.5%)	NS
Q 1.2 Do you agree or disagree with the following statements about weight loss?					
(1) Having the lowest weight possible benefits endurance performance in the long term	Incorrect	51 (50.5%)	110 (74.3%)	161 (64.7%)	0.000
	Correct	50 (49.5%)	38 (25.7%)	88 (35.3%)	***
(2) Eating more protein is the most important dietary change if you want to have more muscle	Incorrect	83 (82.2%)	127 (85.8%)	210 (84.3%)	0.274
	Correct	18 (17.8%)	21 (14.2%)	39 (15.7%)	NS
(3) Eating more energy from protein than you need can make you put on fat	Incorrect	45 (44.6%)	71 (48.0%)	116 (46.6%)	0.344
	Correct	56 (55.4%)	77 (52.0%)	133 (53.4%)	NS
Q 1.3 Do you think the diet changes below are good ways to lose weight?					
(1) Swapping carbohydrates/energy dense foods for low-energy foods like vegetables are good way to lose weight	Incorrect	13 (12.9%)	24 (16.2%)	37 (14.9%)	0.294
	Correct	88 (87.1%)	124 (83.8%)	212 (85.1%)	NS
(2) Eating margarine instead of butter	Incorrect	23 (22.8%)	43 (29.1%)	66 (26.5%)	0.170
	Correct	78 (77.2%)	105 (70.9%)	183 (73.5%)	NS
(3) Eating protein bars and shakes instead of yogurts, muesli/granola bars and fruits	Incorrect	59 (58.4%)	79 (53.4%)	138 (55.4%)	0.256
	Correct	42 (41.6%)	69 (46.6%)	111 (44.6%)	NS
(4) Choosing lower glycemic index (GI) carbohydrates to help regulate appetite	Incorrect	87 (86.1%)	134 (90.5%)	221 (88.8%)	0.190
	Correct	14 (13.9%)	14 (9.5%)	28 (11.2%)	NS
Q 1.4 If they want to lose weight, athletes should:					
(1) Eat less than 50 g (1.7 oz) of carbohydrate per day, (2) Eat less than 20g (0.7 oz) of fat per day, (3) Eat less calories/ kilojoules than your body needs, (4) Not sure	Incorrect	59 (58.4%)	94 (63.5%)	153 (61.4%)	0.248
	Correct	42 (41.6%)	54 (36.5%)	96 (38.6%)	NS
Q 1.5 To ensure they meet their energy (kilojoule/calorie) requirements, all athletes should:					
	Incorrect	21 (20.8%)	38 (25.7%)	59 (23.7%)	0.231

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(1) Plan their diet based on their age, gender, body size, sport and training program, (2) Eat based on their natural hunger and fullness signals, (3) Eat at least 8000 kilojoules (2000 calories) per day, (4) Eat more foods that have lots of carbohydrate, (5) Not sure	Correct	80 (79.2%)	110 (74.3%)	190 (76.3%)	NS
Q1.6 Which is a better recovery meal option for an athlete who wants to put on muscle?					
(1) A 'mass gainer' protein shake and 3 - 4 scrambled eggs, (2) Pasta with lean beef and vegetable sauce, plus a dessert of fruit, yoghurt and nuts, (3) A large piece of grilled chicken with a side salad (lettuce, cucumber, tomato), (4) A large steak and fried eggs, (5) Not sure	Incorrect Correct	81 (80.2%) 20 (19.8%)	120 (81.1%) 28 (18.9%)	201 (80.7%) 48 (19.3%)	0.494 NS
Q1.7 Which is a better recovery meal option for an athlete who wants to lose weight?					
(1) A side salad with no dressing (lettuce, cucumber, tomato), (2) A pure whey protein isolate shake made on water, (3) A mixed meal that includes a small-moderate serving of meat and carbohydrate (e.g., small bowl pasta with lean mincemeat and vegetable sauce) plus a large side salad, (4) Not sure	Incorrect Correct	67 (66.3%) 34 (33.7%)	113 (76.4%) 35 (23.6%)	180 (72.3%) 69 (27.7%)	0.056 NS
Overall classification of participants according to the percentage obtained in the weight management domain (of 12)					
Percentage of weight management domain (Mean±SD)		45.5±14.8	39.8±15.1	0.004**	
Not Accepted (less than 50%)		52 (51.5%)	101 (68.3%)	0.062NS	
Accepted (Equal or more than 50%)		49 (48.5%)	47 (31.7%)		
Total		101(100.0%)	148(100.0%)		

*Q: Question: The P values for numeric variables were calculated using the independent sample t-test, and the P values for string variables were calculated using the Chi2 Tests. NS: Not Significant, *P<0.05, ** P<0.01. SD: Standard Deviation. The percentage obtained for the domain is calculated by dividing the sum of answers by the full score, then multiplying by 100.*

Out of 30 macronutrient questions, only nine garnered a correct response rate of 50% or higher. According to Table 4, 98.0% of respondents correctly answered question 2.5.2. Questions about essential amino acids in eggs (2.10.2) were answered correctly by 86.7% of respondents. Inquiring about muscle-building foods for 100g of chicken breast (2.9.1), 79.9% of respondents provided the correct answer. For question 2.10.1, which pertained to essential amino acids in beef steak, 76.7% answered correctly. 73.1% of respondents got the question about Cheddar cheese fat (2.5.1) right, and 71.9% responded correctly to question 2.5.4 about honey's fat content. Question 2.6.5 on a balanced diet's protein content was accurately answered by 68.7% of respondents. Additionally, 68.3% answered question 2.5.3 about mixed nuts' fat content, and 51.8% correctly responded to question 2.6.4 regarding the body's ability to utilize protein for muscle protein synthesis.

In a survey, it was found that a significant number of respondents answered nutrition-related questions incorrectly. For example, in response to a question about the diet of a moderate-to-high-intensity endurance athlete, 78.7% of the answers were wrong. Additionally, many

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respondents, particularly athlete students, incorrectly answered questions about carbohydrate-rich foods for recovery from high-intensity aerobic exercise and the role of fat in fighting illness. In a different question, most respondents incorrectly agreed that protein is the main fuel muscles use during exercise and that an experienced athlete needs more protein than a young athlete just starting training. The survey also revealed that many respondents wrongly identified foods with enough protein for muscle growth after resistance training. Similarly, many respondents incorrectly believed that lentils contain all essential amino acids and answered incorrectly about the protein content in skim vs. full cream milk. The overall score obtained in the macronutrient domain was less than 50.0%. Athlete students obtained a significantly higher percentage (46.4±8.9%) than non-athlete students (43.5±11.6%) with a P-value of less than 0.05. Most athletes (54.5%) and non-athlete students (65.5%) scored below 50.0% in the domain, with a P-value of less than 0.05, and were classified as unaccepted.

Table 4: Nutrition for Sports Knowledge of Sports and Non-Sports Students Concerning Macronutrient Domain

		Sports students (n=101)	Non-Sports students (n=148)	Total	P-value
		no (%)	no (%)	no (%)	
Q 2.1 An athlete doing a moderate to high-intensity endurance training program for about two hours should eat:					
(1) 1 - 3 g carbohydrate per kg body weight per day, (2) 5-7 g, increasing up to 10 g/kg with intense training/competition loads (15 - 25%) of total daily kilojoule/calorie intake as carbohydrate, (3) 75 - 85% of total daily kilojoule/calorie intake as carbohydrate, (4) Not sure	Incorrect	80 (79.2%)	116 (78.4%)	196 (78.7%)	0.503
	Correct	21 (20.8%)	32 (21.6%)	53 (21.3%)	NS
Q 2.2 Which options have enough carbohydrate for recovery from about 1 hour of high intensity aerobic exercise? Assume the athlete weighs about 70kg and has an important training session again tomorrow.					
(1) 1 medium banana	Incorrect	69 (68.3%)	85 (57.4%)	154 (61.8%)	0.054
	Correct	32 (31.7%)	63 (42.6%)	95 (38.2%)	NS
(2) 1 cup cooked quinoa and 1 tin tuna	Incorrect	83 (82.2%)	102 (68.9%)	185 (74.3%)	0.013
	Correct	18 (17.8%)	46 (31.1%)	64 (25.7%)	*
(3) 1 cup plain yoghurt	Incorrect	64 (63.4%)	96 (64.9%)	160 (64.3%)	0.456
	Correct	37 (36.6%)	52 (35.1%)	89 (35.7%)	NS
(4) 1 cup baked beans on two slices of bread	Incorrect	60 (59.4%)	74 (50.0%)	134 (53.8%)	0.091
	Correct	41 (40.6%)	74 (50.0%)	115 (46.2%)	NS
Q 2.3 Which food has the most carbohydrate?					
(1) 1 cup (168 g/5.6 ounces) boiled rice, (2) 2 slices of white sandwich loaf bread, (3) 1 medium (150 g/ 5 ounces) boiled potato, (4) 1 medium (150 g/5 ounces) ripe banana, (5) Not sure	Incorrect	66 (65.3%)	82 (55.4%)	148 (59.4%)	0.075
	Correct	35 (34.7%)	66 (44.6%)	101 (40.6%)	NS

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Q 2.4 Do you agree or disagree with these statements about fat?					
(1) The body needs fat to fight off sickness	Incorrect	65 (64.4%)	105 (70.9%)	170 (68.3%)	0.169
	Correct	36 (35.6%)	43 (29.1%)	79 (31.7%)	NS
(2) Athletes should not eat more than 20g of fat per day	Incorrect	80 79.2%)	133 (89.9%)	213 (85.5%)	0.016
	Correct	21 (20.8%)	15 (10.1%)	36 (14.5%)	*
(3) When we increase the intensity of exercise, the %) of fat we use as a fuel also increases	Incorrect	72 (71.3%)	107 (72.3%)	179 (71.9%)	0.486
	Correct	29 (28.7%)	41 (27.7%)	70 (28.1%)	NS
(4) When we exercise at a low intensity, our body mostly uses fat as a fuel	Incorrect	65 (64.4%)	91 (61.5%)	156 (62.7%)	0.373
	Correct	36 (35.6%)	57 (38.5%)	93 (37.3%)	NS
Q 2.5 Do you think these foods are high in fat?					
(1) Cheddar cheese	Incorrect	26 (25.7%)	41 (27.7%)	67 (26.9%)	0.424
	Correct	75 (74.3%)	107 (72.3%)	182 (73.1%)	NS
(2) Margarine	Incorrect	1 (1.0%)	4 (2.7%)	5 (2.0%)	0.325
	Correct	100 (99.0%)	144 (97.3%)	244 (98.0%)	NS
(3) Mixed nuts	Incorrect	32 (31.7%)	57 (38.5%)	89 (35.7%)	0.166
	Correct	69 (68.3%)	91 (61.5%)	160 (64.3%)	NS
(4) Honey	Incorrect	25 (24.8%)	45 (30.4%)	70 (28.1%)	0.203
	Correct	76 (75.2%)	103 (69.6%)	179 (71.9%)	NS
Q 2.6 Do you agree or disagree with the statements about protein?					
(1) Protein is the main fuel that muscles use during exercise	Incorrect	72 (71.3%)	116 (78.4%)	188 (75.5%)	0.130
	Correct	29 (28.7%)	32 (21.6%)	61 (24.5%)	NS
(2) Vegetarian athletes can meet their protein requirements without the use of protein supplements	Incorrect	47 (46.5%)	84 (56.8%)	131 (52.6%)	0.073
	Correct	54 (53.5%)	64 (43.2%)	118 (47.4%)	NS
(3) An experienced athlete needs more protein than a young athlete who is just starting training	Incorrect	68 (67.3%)	100 (67.6%)	168 (67.5%)	0.538
	Correct	33 32.7%)	48 (32.4%)	81 (32.5%)	NS
(4) The body has a limited ability to use protein for muscle protein synthesis	Incorrect	38 (37.6%)	82 (55.4%)	120 (48.2%)	0.004
	Correct	63 (62.4%)	66 (44.6%)	129 (51.8%)	**
(5) A balanced diet with enough kilojoules/calories (energy) has enough protein for most athletes	Incorrect	31 (30.7%)	47 (31.8%)	78 (31.3%)	0.486
	Correct	70 (69.3%)	101 (68.2%)	171 (68.7%)	NS
Q 2.7 Which food has the most protein?					
(1) 2 eggs (2) 100g (3 ounces) raw skinless chicken breast (3) 30g (1 ounce) almonds (4) Not sure	Incorrect	49 (48.5%)	89 (60.1%)	138 (55.4%)	0.046
	Correct	52 (51.5%)	59 (39.9%)	111 (44.6%)	*
Q 2.8 The protein needs of a 100 kg (220 lb.) well trained resistance athlete are closest to:					
(1) 100g (1g/kg) (2) 150g (1.5g/kg) (3) 500g (5g/kg) (4) They should eat as much protein as possible (5) Not sure	Incorrect	86 (85.1%)	130 (87.8%)	216 (86.7%)	0.333
	Correct	15 (14.9%)	18 (12.2%)	33 (13.3%)	NS
Q 2.9 Which of these foods do you think have enough protein to promote muscle growth after a bout of resistance exercise?					
(1) 100g (3 ounces) chicken breast	Incorrect	15 (14.9%)	35 (23.6%)	50 (20.1%)	0.060
	Correct	86 (85.1%)	113 (76.4%)	1 (79.9%)	NS
(2) 30g (1 ounce) Yellow cheese	Incorrect	57 (56.4%)	95 (64.2%)	152 (61.0%)	0.136
	Correct	44 (43.6%)	53 (35.8%)	97 (39.0%)	NS
(3) 1 cup baked beans	Incorrect	71 (70.3%)	120 (81.1%)	191 (76.7%)	0.035

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	Correct	30 (29.7%)	28 (18.9%)	58 (23.3%)	*
(4) 1/2 cup cooked quinoa	Incorrect	64 (63.4%)	114 (77.0%)	178 (71.5%)	0.014
	Correct	37 (36.6%)	34 (23.0%)	71 (28.5%)	*
Q 2.10 Do you think these foods have all the essential amino acids needed by the body?					
(1) Beef steak	Incorrect	21 (20.8%)	37(25.0%)	58 (23.3%)	0.269
	Correct	80 79.2%)	111 (75.0%)	191 (76.7%)	NS
(2) Eggs	Incorrect	10 (9.9%)	23 (15.5%)	33 (13.3%)	0.136
	Correct	91 (90.1%)	125 (84.5%)	216 (86.7%)	NS
(3) Lentils	Incorrect	78 (77.2%)	103 (69.6%)	181 (72.7%)	0.118
	Correct	23 (22.8%)	45 (30.4%)	68 (27.3%)	NS
(4) Cow's Milk	Incorrect	48 (47.5%)	76 (51.4%)	124 (49.8%)	0.321
	Correct	53 (52.5%)	72 (48.6%)	125 (50.2%)	NS
Q 2.11 The amount of protein in skim milk compared to full cream milk is:					
(1) Much less, (2) About the same, (3) Much more, (4) Not sure	Incorrect	80 (79.2%)	119 (80.4%)	199 (79.9%)	0.469
	Correct	21 (20.8%)	29 (19.6%)	50 (20.1%)	NS
Overall classification of participants according to the percentage obtained in the macronutrient domain (out of 30)					
Percentage of macronutrients domain (Mean±SD)		46.4±8.9	43.5±11.6	0.033*	
Not Accepted (less than 50%)		55 (54.5%)	97 (65.5%)	0.021*	
Accepted (Equal or more than 50%)		46 (45.5%)	51 (34.5%)		
Total		101(100.0%)	148(100.0%)		

*Q: Question: The P values for numeric variables were calculated using the independent sample t-test, and the P values for string variables were calculated using the Chi2 Tests. NS: Not Significant, *P<0.05, ** P<0.01. SD: Standard Deviation. The percentage obtained for the domain is calculated by dividing the sum of answers by the full score, then multiplying by 100.*

Table 5 showed that out of 13 questions about micronutrients, only 4 received correct responses. Specifically, 96.4% of respondents (97.0% and 95.9%, respectively) accurately affirmed that "calcium is the primary component of bone," 80.3% (80.2% and 80.4%, respectively) correctly affirmed that "women experiencing monthly periods require more iron than men," 65.5% (69%, 68.3%, and 63.5%, respectively) correctly acknowledged that "Vitamin D enhances calcium absorption," and 54.2% (55.4% and 53.4%, respectively) agreed that "Meat, chicken, and fish serve as good sources of zinc".

The results highlight that many respondents made errors when responding to specific micronutrient nutrition-related questions. For instance, 90.4% of respondents (90.1% and 90.5%, respectively) inaccurately affirmed that a fit individual consuming a balanced diet can enhance sports performance by increasing vitamin and mineral intake from food. Similarly, 89.6% of respondents (84.2% and 93.2%, respectively) incorrectly affirmed that athletes aged 15 to 24 years require 500 mg of calcium daily, and 89.2% (89.1% and 89.2%, respectively) inaccurately affirmed that Thiamine (Vitamin B1) is essential for transporting oxygen to

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muscles. Furthermore, 88.4% (89.1% and 87.8%, respectively) erroneously agreed that iron is essential for converting food into usable energy, and 84.3% (84.2% and 84.5%, respectively) incorrectly affirmed that vitamins contain energy. Additionally, 78.7% (74.3% and 81.8%, respectively) incorrectly agreed that wholegrain foods are good sources of vitamin C, 71.5% (74.3% and 69.6%, respectively) inaccurately affirmed that fruits and vegetables are good sources of calcium, 57.0% (54.5% and 58.8%, respectively) incorrectly disagreed that Vitamin C functions as an antioxidant, and 51.0% (52.5% and 50.0%, respectively) inaccurately disagreed that fatty fish serves as a good source of vitamin D.

The overall score achieved in the micronutrient domain fell below 50.0%. Athlete students achieved a higher average score (39.1±15.2%) than non-athlete students (37.5±14.7%). Most athletes (75.3%) and non-athlete students (82.4%) scored below 50.0% in this domain, warranting classification as not meeting the required standard.

Table 5: Nutrition for Sports Knowledge of Sports and Non-Sports Students concerning Micronutrient Domain

	Answer	Sports students (n=101)	Non-Sports students (n=148)	Total	P-value
		no (%)	no (%)	no (%)	
Q 3.1 Do you agree or disagree with these statements on vitamins and minerals?					
(1) Calcium is the main component of bone	Incorrect	3 (3.0%)	6 (4.1%)	9 (3.6%)	0.467
	Correct	98 (97.0%)	142 (95.9%)	240 (96.4%)	NS
(2) Vitamin C is an anti-oxidant	Incorrect	55 (54.5%)	87 58.8%)	142 (57.0%)	0.292
	Correct	46 (45.5%)	61 (41.2%)	107 (43.0%)	NS
(3) Thiamine (Vitamin B1) is needed to take oxygen to muscles	Incorrect	90 (89.1%)	132 (89.2%)	222 (89.2%)	0.570
	Correct	11 (10.9%)	16 (10.8%)	27 (10.8%)	NS
(4) Iron is needed to turn food into usable energy	Incorrect	90 (89.1%)	130 (87.8%)	220 (88.4%)	0.462
	Correct	11 (10.9%)	18 (12.2%)	29 (11.6%)	NS
(5) Vitamin D enhances calcium absorption	Incorrect	32 (31.7%)	54 (36.5%)	86 (34.5%)	0.259
	Correct	69 68.3%)	94 (63.5%)	163 (65.5%)	NS
(6) Meat, chicken and fish are good sources of zinc	Incorrect	45 (44.6%)	69 (46.6%)	114 (45.8%)	0.424
	Correct	56 (55.4%)	79 (53.4%)	135 (54.2%)	NS
(7) Wholegrain foods are good sources of vitamin C	Incorrect	75 (74.3%)	121 (81.8%)	196 (78.7%)	0.104
	Correct	26 (25.7%)	27 (18.2%)	53 (21.3%)	NS
(8) Fruit and vegetables are good sources of calcium	Incorrect	75 (74.3%)	103 69.6%)	178 (71.5%)	0.256
	Correct	26 (25.7%)	45 (30.4%)	71 (28.5%)	NS
(9) Fatty fish is a good source of vitamin D	Incorrect	53 (52.5%)	74 (50.0%)	127 (51.0%)	0.400
	Correct	48 (47.5%)	74 (50.0%)	122 (49.0%)	NS
(10) Women who have a monthly period need more iron than men	Incorrect	20 (19.8%)	29 (19.6%)	49 (19.7%)	0.546
	Correct	81 (80.2%)	119 (80.4%)	200 (80.3%)	NS

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(11) Athletes aged 15 to 24 years need 500 mg of calcium each day	Incorrect	85 (84.2%)	138 (93.2%)	223 (89.6%)	0.019
	Correct	16 (15.8%)	10 (6.8%)	26 (10.4%)	*
(12) A fit person eating a balanced diet can improve their athletic performance by eating more vitamins and minerals from food	Incorrect	91 (90.1%)	134 (90.5%)	225 (90.4%)	0.536
	Correct	10 (9.9%)	14 (9.5%)	24 (9.6%)	NS
(13) Vitamins contain energy (kilojoules/calories)	Incorrect	85 (84.2%)	125 (84.5%)	210 (84.3%)	0.542
	Correct	16 (15.8%)	23 (15.5%)	39 (15.7%)	NS
Overall classification of participants according to the percentage obtained in the micronutrient domain (out of 13)					
Percentage of micronutrients domain (Mean±SD)		39.1±15.2	37.5±14.7	0.401 NS	
Not Accepted (less than 50%)		76 (75.3%)	122 (82.4%)	0.502NS	
Accepted (Equal or more than 50%)		25 (24.7%)	26 (17.6%)		
Total		101(100.0%)	148(100.0%)		

*Q: Question: The P values for numeric variables were calculated using the independent sample t-test, and the P values for string variables were calculated using the Chi2 Tests. NS: Not Significant, *P<0.05, ** P<0.01. SD: Standard Deviation. The percentage obtained for the domain is calculated by dividing the sum of answers by the full score, then multiplying by 100.*

The analysis of Table 6 indicates that only two out of twelve questions in the sports nutrition domain were answered correctly. Among the participants, 55.4% of athletes correctly disagreed with question 4.6.1, which asserts that "Eating carbohydrates when you exercise makes it harder to build strength and muscles." Conversely, most non-athletes (56.8%) answered this question incorrectly. However, 62.7% of all respondents (61.4% of athletes and 63.5% of non-athletes) correctly concurred, "Eating carbohydrates when you exercise will help keep blood sugar levels stable."

Regrettably, many respondents demonstrated an inability to respond accurately to a series of sports nutrition-related questions. Specifically, 96.8% of respondents failed to indicate the amount of protein recommended for consumption after resistance exercise, as stipulated in question 4.11, which is "0.3g/kg body weight (~ 15 - 25 g for most athletes)". Furthermore, 96.0% of respondents did not identify the correct reason for athletes to drink water: "Keep plasma (blood) volume stable," as per question 4.1. Additionally, misunderstandings were evident in the responses to questions 4.4, 4.7, 4.9, 4.2, 4.6.2, 4.10, 4.8, and 4.5, reflecting a lack of clarity on important aspects of athletes' nutritional requirements. Notably, responses for question 4.6.2 indicated that 69.1% of respondents disagreed incorrectly with the statement, "In events lasting 60 - 90 minutes, 30 - 60 g of carbohydrates should be eaten per hour". Furthermore, a concerning trend emerged in question 4.10, where 65.5% of respondents failed to acknowledge that post-competition nutrition should be high in "Carbohydrates and protein." In addition, 56.6% of respondents, particularly non-athletes, espoused

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misconceptions regarding the dietary recommendations for athletes during competitions in question 4.8.

The collective performance in sports nutrition yielded an overall score below 50.0%. Athlete students demonstrated a higher mean score of 30.1±13.9% than non-athlete students whose mean score was 27.6±15.8%. Most athlete students (83.2%) and non-athlete students (86.5%) scored below the 50.0% threshold in this domain, thus failing to meet the established standard.

Table 6: Nutrition for Sports Knowledge of Sports and Non-Sports Students concerning Sports Nutrition Domain

		Sports students (n=101)	Non-Sports students (n=148)	Total	P-value
		no (%)	no (%)	no (%)	
Q 4.1 Athletes should drink water to:					
(1) Keep plasma (blood) volume stable, (2) Stop dry mouth, (3) Allow proper sweating, (4) All of the above, (5) Not sure	Incorrect	99 (98.0%)	140 (94.6%)	239 (96.0%)	0.153
	Correct	2 (2.0%)	8 (5.4%)	10 (4.0%)	
Q 4.2 Experts think that athletes should:					
(1) Drink 50 - 100 ml every 15 - 20 minutes, (2) Suck on ice cubes rather than drinking during practice, (3) Drink sports drinks rather than water when exercising, (4) Drink to a plan, based on body weight changes during training sessions performed in a similar climate, (5) Not sure	Incorrect	77 (76.2%)	116 (78.4%)	193 (77.5%)	0.402
	Correct	24 (23.8%)	32 (21.6%)	56 (22.5%)	
Q 4.4 How much sodium (salt) should fluid consumed for hydration purposes (during exercise) contain?					
(1) At least 11 - 25 mmol/L (~ 250 - 575 mg/L), (2) At least 4 - 8 mmol/L (~ 90 - 185 mg/L), (3) None, (4) Not sure	Incorrect	97 (96.0%)	137 (92.6%)	234 (94.0%)	0.197
	Correct	4 (4.0%)	11 (7.4%)	15 (6.0%)	
Q 4.5 Before competition, athletes should eat foods that are high in:					
(1) Fluids, fat and carbohydrate, (2) Fluids, fiber and carbohydrate, (3) Fluids and carbohydrate, (4) Not sure	Incorrect	52 (51.5%)	81 (54.7%)	133 (53.4%)	0.354
	Correct	49 (48.5%)	67 (45.3%)	116 (46.6%)	
Q 4.6 Do you agree or disagree with the statements on carbohydrate?					
(1) Eating carbohydrates when you exercise makes it harder to build strength and muscles	Incorrect	45 (44.6%)	84 (56.8%)	129 (51.8%)	0.039
	Correct	56 (55.4%)	64 (43.2%)	120 (48.2%)	
(2) In events lasting 60 - 90 minutes, 30- 60 g (1.0 - 2.0 ounces) of carbohydrates should be eaten per hour	Incorrect	64 (63.4%)	108 73.0%)	172 (69.1%)	0.071
	Correct	37 (36.6%)	40 (27.0%)	77 (30.9%)	
(3) Eating carbohydrates when you exercise will help keep blood sugar levels stable	Incorrect	39 (38.6%)	54 (36.5%)	93 (37.3%)	0.417
	Correct	62 (61.4%)	94 (63.5%)	156 (62.7%)	
Q 4.7 Some athletes get a sore stomach if they eat during exercise. What might make stomach pain worse?					
(1) Having energy gels rather than water or sports drinks, (2) Having small amounts of water at a time, (3) Having sports drinks with different types of carbohydrates (e.g., fructose and sucrose), (4) Not sure	Incorrect	80 (79.2%)	119 (80.4%)	199 (79.9%)	0.469
	Correct	21 (20.8%)	29 (19.6%)	50 (20.1%)	
Q 4.8 During a competition, athletes should eat foods that are high in:					
(1) Fluids, fiber and fat, (2) Fluids and protein, (3) Fluids and carbohydrate, (4) Not sure	Incorrect	52 (51.5%)	89 (60.1%)	141 (56.6%)	0.111
	Correct	49 (48.5%)	59 (39.9%)	108 (43.4%)	

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Q 4.9 Which is the best snack to have during an intense 90-minute training session?					
(1) A protein shakes (2) A ripe banana (3) 2 boiled eggs (4) A handful of nuts (5) Not sure	Incorrect Correct	79 (78.2%) 22 (21.8%)	117 (79.1%) 31 (20.9%)	196 (78.7%) 53 (21.3%)	0.497 NS
Q 4.10 After a competition, athletes should eat foods that are high in?					
(1) Protein, carbohydrate and fat (2) Only protein (3) Only carbohydrate (4) Carbohydrate and protein (5) Not sure	Incorrect Correct	66 (65.3%) 35 (34.7%)	97 (65.5%) 51 (34.5%)	163 (65.5%) 86 (34.5%)	0.540 NS
Q 4.11 How much protein do you think experts say athletes should eat after resistance exercise?					
(1) 0.3g/kg body weight (~ 15 - 25 g for most athletes) (2) 1.0 g/kg body weight (~ 50 - 100 g for most athletes) (3) 1.5g/kg body weight (~ 150 – 130 g for most athletes) (4) Not sure	Incorrect Correct	97 (96.0%) 4 (4.0%)	144 (97.3%) 4 (2.7%)	241 (96.8%) 8 (3.2%)	0.418 NS
Overall classification of participants according to the percentage obtained in the sports nutrition domain (out of 12)					
Percentage of sports nutrition domain (Mean±SD)		30.1±13.9	27.6±15.8	0.194 NS	
Not Accepted (less than 50%)		84 (83.2%)	128 (86.5%)	1.000 NS	
Accepted (Equal or more than 50%)		17 (16.8%)	20 (13.5%)		
Total		101(100.0%)	148(100.0%)		

*Q: Question: The P values for numeric variables were calculated using the independent sample t-test, and the P values for string variables were calculated using the Chi2 Tests. NS: Not Significant, *P<0.05, ** P<0.01. SD: Standard Deviation. The percentage obtained for the domain is calculated by dividing the sum of answers by the full score, then multiplying by 100.*

Regrettably, most respondents provided incorrect answers to most of the questions related to the critical issue of supplementation in sports nutrition. Only one question received a correct response from approximately two-thirds of the participants. Question 5.5 garnered the lowest correct answer rate, with 94.8% of respondents providing an inaccurate response. This was closely followed by question 5.2, where 93.2% of respondents answered incorrectly. In question 5.1, a significant proportion of respondents incorrectly concurred with statements advocating using certain supplements, such as Iron tablets, Vitamin C, B vitamins, and salt tablets. For question 5.4, numerous respondents also provided erroneous responses regarding statements about supplements, including Creatine, Beta-Alanine, Beetroot juice, and Caffeine. The overall scores in the domain of supplementation fell below 50.0%. Moreover, non-athlete students achieved a marginally higher average score than athlete students. Importantly, most athletes and non-athlete students scored below 50.0% in this domain, signifying a failure to meet the required standard.

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Table 7: Nutrition for Sports Knowledge of Sports and Non-Sports Students Concerning Supplementation Domain

		Sports students (n=101)	Non-Sports students (n=148)	Total	P-value
		no (%)	no (%)	no (%)	
Q 5.1 Do you agree or disagree with the statements about vitamin and mineral supplements?					
(1) Vitamin C should always be taken by athletes	Incorrect	89 88.1%)	137 (92.6%)	226 (90.8%)	0.166
	Correct	12 (11.9%)	11 (7.4%)	23 (9.2%)	NS
(2) B vitamins should be taken if energy levels are low	Incorrect	91 (90.1%)	135 (91.2%)	226 (90.8%)	0.465
	Correct	10 (9.9%)	13 (8.8%)	23 (9.2%)	NS
(3) Salt tablets should be taken by athletes that get cramps when they exercise	Incorrect	85 (84.2%)	109 (73.6%)	194 (77.9%)	0.034*
	Correct	16 (15.8%)	39 (26.4%)	55 (22.1%)	
(4) Iron tablets should be taken by all athletes who feel tired and are pale	Incorrect	92 (91.1%)	138 (93.2%)	230 (92.4%)	0.346
	Correct	9 (8.9%)	10 (6.8%)	19 (7.6%)	NS
Q 5.2 All supplements are tested to make sure they are safe, don't have any contamination.					
(1) Agree, (2) Disagree, (3) Not sure	Incorrect	97 (96.0%)	135 (91.2%)	232 (93.2%)	0.108
	Correct	4 (4.0%)	13 (8.8%)	17 (6.8%)	NS
Q 5.3 Supplement labels may sometimes say things that are not true.					
(1) Agree, (2) Disagree, (3) Not sure	Incorrect	36 (35.6%)	42 (28.4%)	78 (31.3%)	0.141
	Correct	65 (64.4%)	106 (71.6%)	171 (68.7%)	NS
Q 5.4 Do you agree or disagree with the statements about supplements?					
(1) Creatine makes the brain think that exercise feels easier	Incorrect	82 (81.2%)	135 (91.2%)	217 (87.1%)	0.017*
	Correct	19 (18.8%)	13 (8.8%)	32 (12.9%)	
(2) Caffeine makes muscles able to work harder even without more oxygen	Incorrect	62 (61.4%)	85 (57.4%)	147 (59.0%)	0.312
	Correct	39 (38.6%)	63 (42.6%)	102 (41.0%)	NS
(3) Beetroot juice (nitrates) makes muscles feel less sore after exercise	Incorrect	82 (81.2%)	115 (77.7%)	197 (79.1%)	0.308
	Correct	19 (18.8%)	33 (22.3%)	52 (20.9%)	NS
(4) Beta-Alanine can decrease how much acid muscles make during intense exercise	Incorrect	90 (89.1%)	123 83.1%)	213 (85.5%)	0.127
	Correct	11 (10.9%)	25 (16.9%)	36 (14.5%)	NS
Q 5.5 Which supplement does not have enough evidence in relation to improving body composition or sporting performance?					
(1) Caffeine, (2) Ferulic acid, (3) Bicarbonate, (4) Leucine, (5) Not sure	Incorrect	97 (96.0%)	139 (93.9%)	236 (94.8%)	0.333
	Correct	4 (4.0%)	9 (6.1%)	13 (5.2%)	NS
Q 5.6 WORLD ANTI-DOPING AGENCY (WADA) bans the use of….					
(1) Caffeine, (2) Bicarbonate, (3) Carnitine, (4) Testosterone, (5) Not sure	Incorrect	71 (70.3%)	113 (76.4%)	184 (73.9%)	0.178
	Correct	30 (29.7%)	35 (23.6%)	65 (26.1%)	NS
Classification of participants according to the percentage obtained in the supplementation domain (out of 12)					
Percentage of Supplementation Domain (Mean±SD)		19.6±12.6	20.8±11.8	0.445 NS	
Not Accepted (less than 50%)		97 (96.0%)	147 (99.3%)	0.154 NS	
Accepted (Equal or more than 50%)		4 (4.0%)	1 (0.7%)		
Total		101(100.0%)	148(100.0%)		

*Q: Question: The P values for numeric variables were calculated using the independent sample t-test, and the P values for string variables were calculated using the Chi2 Tests. NS: Not Significant, *P<0.05, ** P<0.01. SD: Standard Deviation. The percentage obtained for the domain is calculated by dividing the sum of answers by the full score, then multiplying by 100.*

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The data in Table 8 shows that only 5.9% of athletes and 7.4% of non-athletes demonstrated an acceptable level of sports nutrition knowledge across the five domains. More importantly, it was found that sports students significantly outperformed non-sports students, scoring higher mean values in the questionnaire (38.5±6.8% vs. 36.1±9.0%, respectively). This significant difference underscores the crucial role of education in enhancing sports nutrition knowledge.

Table 8: Nutrition for Sports Knowledge of Sports and Non-Sports Students Concerning Overall NSKQ (out of 79)

	Sports students (n=101)	Non-Sports students (n=148)	P-value
	no (%)	no (%)	
Not Accepted (less than 50%)	95 (94.1%)	137 (92.6%)	0.426
Accepted (Equal or more than 50%)	6 (5.9%)	11 (7.4%)	NS
NSKQ percentage (Mean±SD)	38.5±6.8	36.1±9.0	0.015*

*The P values for numeric variables were calculated using the independent sample t-test, and the P values for string variables were calculated using the Chi2 Tests. NS: Not Significant, *P<0.05. SD: Standard Deviation. NSKQ: Nutrition for Sports Knowledge Questionnaire. The percentage obtained for the NSKQ domains is calculated by dividing the sum of answers by the full score, then multiplying by 100.*

4. Discussion

This study focused on female university students from Menoufia University in Shibin El Kom, Egypt. A total of 249 students participated; among them, 101 were sports students (the cases) from the Faculty of Physical Education, while 148 were non-sports students (the controls) selected from other theoretical faculties. To assess their knowledge of sports nutrition, the Nutrition for Sport Knowledge Questionnaire (NSKQ) was utilized. This comprehensive tool contains 89 questions divided into six sub-sections.

The study indicated no significant differences in BMI between the two groups. A comparison with existing literature (14) revealed that underweight and normal BMI groups generally exhibit healthier profiles. However, body composition characteristics are used to assess health status in both athletic and non-athletic populations (15).

It is important to be cautious when relying solely on body weight or BMI, especially in athletic populations. While BMI is a commonly used metric, it does not differentiate between the various components of the body and fails to reflect fat distribution. This means that individuals with a high fat-free mass (FFM) relative to their height, such as athletes and younger adults, can have elevated BMI values without necessarily being classified as obese (16, 17). Therefore, it is vital to interpret BMI results carefully and consider additional health metrics.

The study revealed a significant difference in weight management knowledge between sports and non-sports students, with sports students outperforming their peers (P<0.01). However, it is concerning that most

participants scored below 50% in this area, reflecting a general lack of understanding regarding weight management concepts.

The comparison of weight management knowledge between sports and non-sports female university students provided important insights into their nutritional awareness. Research indicates that both groups demonstrated inadequate nutritional knowledge, with no substantial differences overall. Consistent with these findings, female students showed a greater interest in weight management, with 50.8% expressing concern compared to only 36.0% of males (18). Athletes tended to adopt a more informed approach to weight management, likely due to their training and education in sports nutrition (19). These results suggest that targeted nutrition education for non-sports female students could significantly improve their understanding of effective weight management strategies (13).

The findings of this study highlight a concerning lack of knowledge about macronutrients among both sports and non-sports students, with an overall score below 50%. Sports students performed significantly better than their non-sports counterparts ($P<0.05$); however, a considerable majority from both groups still scored below the acceptable threshold, with 54.5% of sports students and 65.5% of non-sports students falling short.

Various studies indicate significant differences in macronutrient knowledge between female athletes and non-athletes in universities. Female athletes generally exhibit a higher level of nutrition knowledge, particularly regarding macronutrient intake. Athletes displayed superior understanding of macronutrient requirements, with research indicating they recognize the importance of carbohydrates, proteins, and fats for optimal performance (20). Additionally, the same study revealed that athletes tend to have better dietary habits and nutrition knowledge compared to non-athletes. In a study focusing on Division II female athletes, it was found that overall nutritional knowledge was inadequate, with an average score of 54.7%. This indicates a pressing need for improved education on macronutrient intake (12).

Non-athlete females typically show lower nutrition knowledge scores. Studies reveal that their understanding of macronutrient needs is less comprehensive (20.21). The reported dietary intake among non-athletes often falls short of recommended levels, reflecting a lack of awareness regarding optimal macronutrient distribution (20).

The results from the micronutrient domain reveal a significant knowledge gap, with an overall average score below 50%. While sports students achieved a higher average score than their non-sports counterparts, a concerning majority—75.3% of sports students and

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82.4% of non-sports students—scored below the acceptable level.

The research shows no significant differences in micronutrient knowledge between female sports and non-sports university students. Both groups generally display low levels of nutrition knowledge, lacking substantial disparities in their understanding of micronutrients. This conclusion is supported by multiple studies assessing nutrition knowledge among these populations.

For instance, a study involving 178 student-athletes found that female athletes scored slightly lower than male athletes (61.6% vs. 62.4%), but the difference was not statistically significant (22). Another study indicated that female students outperformed male students in general nutrition knowledge, suggesting a potential gender disparity in knowledge levels (21). The consistent findings of inadequate micronutrient knowledge across both groups highlight the need for improved educational programs specifically designed to address these gaps (2).

The findings in the field of sports nutrition reveal a significant lack of knowledge, with only two out of twelve questions answered correctly. While sports students had a higher average score compared to non-sports students, the majority from both groups still performed poorly, with 83.2% of sports students and 86.5% of non-sports students scoring below the acceptable threshold of 50%.

In line with these findings, a study conducted in Lebanon also discovered that university athletes had insufficient knowledge of sports nutrition, achieving a mean score of 63.54%. This further supports the idea that both athletes and non-athletes lack adequate nutrition knowledge (2). Interestingly, female athletes scored higher in nutrition knowledge assessments than non-nutrition students, particularly in the area of sports nutrition (19,21).

The study reveals a significant gap in knowledge regarding supplementation in sports nutrition. Most participants answered questions incorrectly, with only one question receiving correct responses from about two-thirds of those surveyed.

Athletes demonstrated better knowledge of nutritional supplements than recreational individuals, scoring an average of 77.2% correct answers versus 67.7% for recreational users (23). Furthermore, a separate study indicated that high school athletes improved their understanding of third-party tested supplements following an educational intervention, underscoring the potential effectiveness of targeted education (24).

While 28.6% of athletes rely on trainers for supplement decisions, 67.9% of recreational users make their own independent choices (23). Additionally, Olympic athletes exhibited greater familiarity with third-party testing systems compared to their non-Olympic counterparts, highlighting a disparity in

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knowledge based on competitive status (25).

Despite their higher levels of knowledge, many athletes remain uninformed about nutrition, with 30.9% reporting a lack of knowledge (23). This suggests that both groups would benefit from improved education on supplementation to reduce health risks associated with uninformed use.

The study reveals that only 5.9% of sports students and 7.4% of non-sports students demonstrated an acceptable level of sports nutrition knowledge across the five assessed domains. While sports students achieved significantly higher mean scores than their non-athletic counterparts (38.5±6.8% vs. 36.1±9.0%, $P<0.05$), the overall low percentages highlight a critical need for enhanced educational initiatives in sports nutrition for both groups.

In agreement with our findings, a study of female athletes found that their overall nutritional knowledge score was only 54.7%, with just 8.4% passing the survey, indicating poor understanding across both team and individual sports (12). Similarly, recreational female athletes scored poorly on sports nutritional knowledge, averaging 45.2%, while their general nutritional knowledge was slightly better at 62.7% (4). Another study indicated that female athletes scored an average of 52 on the Nutrition for Sport Knowledge Questionnaire, reflecting inadequate nutrition knowledge (26). Additionally, Turner et al. (27) found that elite standard squash players conveyed average nutrition knowledge, with a mean NSKQ score of 48.78 ± 10.06 (56.07% ± 11.56%).

However, female athletes with prior nutritional education scored higher, emphasizing the importance of formal training in improving nutritional knowledge (4,21). In a broader context, female university students outperformed their male counterparts in general nutrition knowledge, suggesting that educational background influences knowledge levels (21).

Despite these findings, it is essential to note that non-sports females may also lack adequate nutritional knowledge, potentially due to similar educational gaps. This highlights a broader issue of nutritional education across all university demographics and suggests a need for enhanced educational interventions tailored to both populations.

5. Conclusion

Sports students had significantly better weight management knowledge than non-sports students. However, both groups scored below 50%. Notably, the majority of participants, including sports students, scored below the acceptable threshold in macronutrient knowledge, which was below 50%. It is concerning that more than three-fourths of the respondents did not meet the acceptable knowledge levels in the micronutrient domain, indicating a high percentage of insufficient knowledge in this area. The sports nutrition domain showed

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significant deficiencies, with only two correct responses out of twelve. Despite higher mean scores among sports students, they still scored below 50%.

These findings, which show that only 5.9% of sports students and 7.4% of non-sports students have acceptable sports nutrition knowledge, underscore the shared responsibility for improving this situation. They highlight the urgent need for enhanced educational initiatives in sports nutrition for both groups, engaging all stakeholders in this important task.

6. References

1. Ozdoğan Y, Ozcelik AO. Evaluation of the nutrition knowledge of sports department students of universities. Journal of the International Society of Sports Nutrition. 2011 Dec;8:1-7.
2. Serhan MH, Yakan M, Serhan C. Sports nutrition knowledge translates to enhanced athletic performance: a cross-sectional study among Lebanese university athletes. Nutrition & Food Science. 2022 Nov 15;53(6):946-58.
3. Franjić S. Athletes and nutrition. **Спорт**, **медији и бизнис**. 2023;9(1):73-83.
4. Boucherville Pereira IS, Lima KR, Teodoro da Silva RC, Pereira RC, Fernandes da Silva S, Gomes de Moura A, César de Abreu W. Evaluation of general and sports nutritional knowledge of recreational athletes. Nutrition and Health. 2023 May 24:02601060231176316.
5. Dagar D, Rehman Ansari MH, Mahajan P. General Nutrition Knowledge, and Dietary Intake among Sportsmen and Coaches: A Review Study. Indian Journal of Public Health Research & Development. 2024 Apr 1;15(2).
6. Jayawardena R, Weerasinghe K, Nanayakkara I, Madhujith T, Hills AP, Kalupahana NS. The effects of a nutritional intervention on the sports nutrition knowledge and nutritional status of elite athletes: protocol for a randomized controlled trial. 16 July 2024, PREPRINT (Version 1) available at Research Square [https://doi.org/10.21203/rs.3.rs-4390989/v1]
7. Pai NN, Brown RC, Black KE. Risk of low energy availability and nutrition knowledge among female team sport athletes. The Journal of Sports Medicine and Physical Fitness. 2024 Feb 2(64): 5.
8. VILARDI TC, RIBEIRO BG, SOARES ED. Nutrition disorders in female athletes and their interrelationships. Revista de Nutrição. 2001;14:61-9.
9. HALVORSEN II DK. Nutrition and the athlete. InAdolescent Health Care 1982 Jan 1 (pp. 97-118). Academic Press.
10. Manders, R.J., White, A.M., Munson, E.M. and Hulton, A. Evaluation of a Nutritional Education Intervention to Improve Nutrition Knowledge Within Female Rugby Union Athletes. Medicine and science in sports and exercise, 2022, 54(9S), pp.165-166.
11. Henriques R, Abreu B, Figueiredo J, Loureiro H. Assessment of Nutritional

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Menoufia University, Shibin El Kom, Egypt

Knowledge, Alcohol and Tobacco Consumption in Amateur and Elite Youth Football Players. Journal of Sports Medicine and Therapy. 2024 Sep 6;9(3):068-72.

12. Allie C, Miltenberger M, Davis FACSM S, Snyder B, Nester K. Nutritional Knowledge of Division II Female Athletes in Team vs Individual Sports. InInternational Journal of Exercise Science: Conference Proceedings 2024, 9(12): 135.

13. Trakman GL, Forsyth A, Hoye R, Belski R. The nutrition for sport knowledge questionnaire (NSKQ): development and validation using classical test theory and Rasch analysis. Journal of the International Society of Sports Nutrition. 2017 Dec;14(26):2-11.

14. Bozlar V, Arslanoglu C. Healthy Life Style Behaviors of University Students of School of Physical Education and Sports in Terms of Body Mass Index and Other Variables. Universal Journal of Educational Research. 2016;4(5):1189-95.

15. Moon JR, Eckerson JM, Tobkin SE, Smith AE, Lockwood CM, Walter AA, Cramer JT, Beck TW, Stout JR. Estimating body fat in NCAA Division I female athletes: a five-compartment model validation of laboratory methods. European journal of applied physiology. 2009 Jan;105:119-30.

16. Torstveit MK, Sundgot-Borgen J. Are under-and overweight female elite athletes thin and fat? A controlled study. Medicine & Science in Sports & Exercise. 2012 May 1;44(5):949-57.

17. Kruschitz R, Wallner-Liebmann SJ, Hamlin MJ, Moser M, Ludvik B, Schnedl WJ, Tafeit E. Detecting body fat–a weighty problem BMI versus subcutaneous fat patterns in athletes and non-athletes. PloS one. 2013 Aug 26;8(8):e72002.

18. Kang NE, Kim J, Yoon HR. Study on differences in perception of weight management, balanced food intake, knowledge of obesity, and nutrition knowledge in male and female university students. Journal of the Korean Society of Food Culture. 2012;27(6):759-68.

19. Tam R, Flood VM, Beck KL, O'Connor HT, Gifford JA. Measuring the sports nutrition knowledge of elite Australian athletes using the Platform to Evaluate Athlete Knowledge of Sports Nutrition Questionnaire. Nutrition & Dietetics. 2021 Nov;78(5):535-43.

20. Cupisti A, D'Alessandro C, Castrogiovanni S, Barale A, Morelli E. Nutrition knowledge and dietary composition in Italian adolescent female athletes and non-athletes. International journal of sport nutrition and exercise metabolism. 2002 Jun 1;12(2):207-19.

21. Kutlu M, Cintesun EE, Ugur H, Tosun MI. Validation and implementation of general and sport nutrition knowledge questionnaire for university students and athletes. Central European Journal of Sport Sciences and Medicine. 2022;40(04): 77-86.

22. Fazilah FM, Atan SA, Zainuddin NF, Kassim AF, Ismail AD, Bakar AH, Kamaruddin HK. Knowledge on sports

Copyrights @ Faculty of Home Economics
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nutrition among student-athletes in Perlis. Malaysian Journal of Movement, Health & Exercise. 2022 Jan 1;11(1):11-4.

23. Barjaktarovic Labovic S, Banjari I, Joksimovic I, Djordjevic Z, Balkić Widmann J, Djurovic D. Sport Nutrition Knowledge among Athletes and Recreational People. In Proceedings 2024 Mar 11, 91(1): 401.

24. Dow E, Schott KD, Morton L, Lybbert H, Nam K, Shumate C, Kulinna P, Wardenaar FC. High school athletes' practical knowledge on where to find and order third-party tested nutritional supplements increases after education when compared to a control group. Nutrition Bulletin. 2024.

25. Wardenaar FC, Hoogervorst D, Vento KA, de Hon, PhD O. Dutch Olympic and non-Olympic athletes differ in knowledge of and attitudes toward third-party supplement testing. Journal of Dietary Supplements. 2021 Nov 2;18(6):646-54.

26. Skinner J, Vento KA, Johnston CS, Wardenaar FC. Using nutrition knowledge and diet quality questionnaires as screening tools to identify female collegiate athletes in need of dietitian referral. Canadian Journal of Dietetic Practice and Research. 2022 May 3;83(3):133-8.

27. Turner O, Mitchell N, Ruddock A, Purvis A, Ranchordas M. Elite squash players nutrition knowledge and influencing factors. Journal of the International Society of Sports Nutrition. 2021 Jun 10;18(1):46. doi:10.1186/s12970-021-00443-3.

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التغذية وعلوم الاطعمة

دراسة مقارنة لقياس مقدار الثقافة الغذائية الرياضية لدى طالبات الجامعات، دراسة عينة ضابطة وعينة مختبرة

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الملخص العربى:

تهدف هذه الدراسة إلى تقييم ومقارنة مستوى المعرفة الغذائية بين الطالبات في كليات الرياضة والطالبات غير الرياضيات من كليات أخرى. حيث أجريت الدراسة على 249 طالبة جامعية - 101 طالبة من كلية علوم الرياضة و148 طالبة من كليات مختلفة. تم اختيار الطالبات من الفرقة الثالثة أو الرابعة، اللاتي تتراوح أعمارهن بين 20 إلى 22 عامًا، واللواتي وافقن على المشاركة. بينما استُبعدت اللاتي لديهن إعاقات أو مشاكل نفسية ولديهن أمراض مزمنة. قيّمت هذه الدراسة معرفة التغذية الرياضية باستخدام استبيان معرفة التغذية للرياضة .(NSKQ) تم قياس طول المشاركات (سم)، ووزن الجسم (كجم)، ومؤشر كتلة الجسم (كجم/م²). تم تحليل البيانات إحصائيًا وعرضها كتكرار، ونسبة مئوية، ومتوسط، وانحراف معياري. أظهرت النتائج أن الطالبات الرياضيات أظهرن أداءً متفوقًا في إدارة الوزن مقارنةً بالطالبات غير الرياضيات (P<0.01)، ولكن معظم الطالبات الرياضيات (51.5%) وغير الرياضيات (68.3%) حصلن على درجات أقل من 50.0%. حققت الطالبات في كليات الرياضة (54.5%) وغير الرياضيات (65.5%) بشكل رئيسي درجات أقل من 50.0% في المغذيات الكبرى .(P<0.05) حصلت معظم الطالبات الرياضيات (75.3%) وغير الرياضيات (82.4%) على درجات أقل من 50.0% في مجال المغذيات الدقيقة. تم الإجابة بشكل صحيح على سؤالين فقط من بين اثني عشر سؤالًا حول التغذية الرياضية. حققت الطالبات الرياضيات متوسط درجات أعلى. أجابت حوالي ثلثي المشاركات بشكل صحيح على سؤال واحد حول المكملات الغذائية. أظهرت الطالبات الرياضيات درجات NSKQ أعلى بكثير (P<0.05) مقارنة بالطالبات غير الرياضيات (38.5±6.8% مقابل 36.1±9.0%، على التوالي). الخلاصة، بينما كانت لدى الطالبات الرياضيات معلومات أكثر من الطالبات غير الرياضيات، إلا أن مستوى معرفتهن الغذائية كان ضعيفًا جدًا، خاصة في المغذيات الدقيقة، والتغذية الرياضية، والمكملات الغذائية.

الكلمات المفتاحية: استبيان قياس الثقافة الرياضية، الرياضيين، التحكم بالوزن، التثقيف الغذائي، المكملات الغذائية.

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