



Applied nutritional investigation

Prevalence of sports supplements consumption and its association with food choices among female elite football players



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ABSTRACT

Objectives: The present study aimed to 1) investigate the consumption of Sports Supplements (SSs) among female elite football players, 2) evaluate the influence of age on SS consumption, and 3) determine the relationship between the consumption of SSs and dietary choices among elite football players.

Methods: A total of 126 female football players of Primera Iberdrola and Reto Iberdrola who participated in this descriptive, observational, and cross-sectional study completed a self-administered questionnaire on SSs and the Athletes' Food Choices Questionnaire.

Results: Overall, 84.1% of participants consumed supplements, mainly for improved sports performance (68.3%) and health (34.1%). The main sources of purchase were the Internet (34.9%) and specialized shops (23.8%), and players were commonly advised by a dietitian-nutritionist to use SSs (56.3%). The SSs most often consumed included whey protein (30.2%), sports drinks (28.6%), creatine monohydrate (28.6%), sports bars (27.8%), and caffeine (27.8%). Older players consumed more supplements at the time of data compilation. Players predominantly acquired these supplements by using the Internet and reported benefits from their use (all $P \leq 0.036$). Additionally, players who consumed SSs conveyed more concern about their food choices.

Conclusions: A high prevalence of female football players consumed SSs, particularly SSs supported by robust scientific evidence. Older players had higher supplement consumption rates. The use of SSs was related to food choices through nutritional characteristics of foods, knowledge about health and nutrition, weight control with the help of food, and the performance benefits players could acquire.

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Introduction

The Fédération Internationale de Football Association (FIFA) has committed to increasing the number of female football players worldwide to 60 million by 2026. In Spain, women's football is currently one of the sports with the greatest growth and acceptance [1]. Football is an acyclic endurance sport [2], with alternating anaerobic and aerobic sequences of short duration but high intensity; its most decisive physical qualities are speed, strength, and endurance [3,4]. Each football player has unique energy and nutritional requirements based on individual characteristics and

competition level, leading to a growing interest in performance optimization and recovery acceleration [5].

Methods for maximizing performance and accelerating recovery have become increasingly popular [5]. Optimal sporting performance and good health largely depend on diet and nutrition [6]. In women's team sports, energy and metabolic inadequacies have been reported [7]. Elite female football players weighing 60 kg may expend approximately 1100 kcal per match, underscoring the importance of addressing nutritional needs [4]. In team sports, maintaining an adequate intake of relevant macronutrients such as carbohydrates and proteins is essential for glucose availability and muscle recovery after exercise [8,9]. Hence, in situations where high energy demand exceeds the athlete's nutritional needs by the accumulation of training sessions or competition, considering

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Sport Supplements (SSs) for specific physical performance or health benefits may be advisable [10].

Sport supplements can potentially offer the previously mentioned benefits, but it is crucial to note that not all supplements are safe, legal, or effective, and some may be harmful. A cost–benefit analysis based on safety, efficacy, and legality should be conducted before providing athletes with SSs [11]. Limited research has used varying criteria to create a scientific evidence–based classification system for SSs, hindering a comprehensive evaluation of the topic. As a result, different international institutions of reference periodically publish position statements to establish the level of evidence for different SSs. Currently, three consensus positions can be highlighted: the Australian Institute of Sport (AIS) [12], the International Society of Sports Nutrition (ISSN) [13], and the International Olympic Committee (IOC) [10]. Specifically, the AIS came up with the ABCD system, which categorizes dietary supplements based on their scientific evidence. Group A, which is further divided into medical supplements, ergogenic aids, and sports foods, contains supplements that have a strong scientific backing for enhancing athlete health and performance. Group B includes dietary supplements with potential benefits, but more research is needed to confirm their effects. Dietary supplements in Group C have evidence against their use, whereas Group D includes substances that are banned [12].

The use of SSs by athletes is widespread; more than 40% of elite athletes are estimated to use them [14]. Athletes consume SSs to enhance athletic performance and address nutritional deficiencies in their diets [15,16]. Consumption patterns vary based on factors such as sex, age, sport characteristics and conditions, or period of the season [15,17]. Although women's use of SSs is lower than men's, especially in endurance sports [18], a recent study of Turkish footballers showed no significant sex differences in reasons for SS use [19]. Football players often use SSs mainly to meet training demands, optimize training sessions and match responses, improve recovery [20], and enhance performance in demanding national and international competitions [10]. Therefore, dietary food choices and use of SSs should be aimed at achieving a balanced and nutritious diet, obtaining specific and immediate performance benefits during competition, improving training efficiency, enhancing recovery during and after training, and reducing the risk of injury, ultimately contributing to overall sports performance [10,11].

Limited comprehensive studies and research exist that thoroughly explore the use of SSs and establish a clear consensus on their use in women's sports, considering female players' dietary choices. The lack of homogeneity among studies makes it difficult to directly compare them and draw conclusive patterns of SS consumption, especially among women, who have been studied less [14]. Female athletes must educate themselves and make informed decisions about use of supplements, despite the potential benefits they may offer [19]. Therefore, the current investigation aimed to 1) investigate the consumption of SSs (i.e., types, reasons for use, sources of information, purchase venues), 2) evaluate the influence of age on SS consumption, and 3) examine the relationship between the consumption of SSs and dietary choices among elite female football players.

Materials and methods

Participants and study design

The present study used a descriptive, observational, and cross-sectional design to evaluate the use of SSs by elite football athletes. A total of 126 female players (mean age, 24.6 ± 4.2 y), divided into two age groups (<24 y [$n = 62$] and >24 y [$n = 64$]), were randomly recruited from the Primera Iberdrola and Reto Iberdrola

leagues and voluntarily agreed to participate in the research. A total of 20.6% of the players competed in the Primera Iberdrola category of the Spanish League (Primera División PRO or Primera División Femenina of the Real Federación Española de Fútbol [RFEF]), and 79.4% competed in the Reto Iberdrola category of the Spanish League (Segunda División PRO or Segunda División Femenina, RFEF). The participants had a minimum professional experience of more than 4 y at the highest levels of women's football, with a training frequency of 4–5 sessions per wk and a session duration of 1.5–2.5 h. The study was in accordance with the Declaration of Helsinki (last revised guidelines, 2013) [21] and was approved by the Biomedical Research Ethics Committee of Andalusia before the study (ref. SS-JFP-2023). A total of eight athletes were excluded from the study because they did not complete the questionnaire.

Procedure

The study was conducted between February and May 2022. After reaching out to clubs through their staff and explaining the purpose of the research, written informed consent was obtained from all participants. Subsequently, participants were provided with a link to a questionnaire. The questionnaire was administered through an online application using Google Forms, which allowed easy and rapid distribution and data collection. The footballers received a questionnaire specifically tailored for the study on their electronic devices. Throughout the questionnaire completion process, the main researcher was available to the participants to answer any questions they had.

Instruments

Nutritional supplement use and consumption questionnaire

The questionnaire was previously developed and validated by a group of 25 experts in different disciplines (i.e., nutrition, sports science, sports medicine, pharmacology, and chemistry) [22,23]. The questionnaire aimed to evaluate the use of SSs, the expectations surrounding their consumption, the sources of information used by individuals to select SSs, and the location of SS purchase. The questionnaire was divided into three sections: 1) anonymous data on the general characteristics of players, including their date of birth, height, weight, sport practice, and competitive level; 2) general information on diet and sports supplement use, including whether participants were in favor of or against consuming SSs or whether they had taken SSs at any point in their sporting career; and 3) information on current consumption of SSs when participants were completing the questionnaire. This included details on the types of SSs, the duration of use, the purpose for taking them, the place of purchase, the person who recommended their use, and the perceived effectiveness of consumption.

Athlete Food Choice Questionnaire

The food choice questionnaire aimed to identify the determinants of the players' food choices (i.e., what things players took into account when choosing how to eat in their day-to-day lives) [24]. The questionnaire was structured in a total of 9 dimensions: 1) nutritional characteristics of foods, 2) emotional influence, 3) health and dietary knowledge, 4) influence of others, 5) habitual eating habits, 6) weight control, 7) dietary principles and beliefs, 8) sensory appeal, and 9) performance. Within each dimension, each question was structured on a Likert-type scale of 1 to 5 points (1, "never"; 5, "always") concerning the food choices covered by that dimension.

Statistical analysis

Statistical analysis was performed with IBM SPSS, version 25, on the Windows operating system (SPSS, Inc., Chicago, IL, USA). Means and SDs were calculated for quantitative variables. Qualitative variables were expressed as frequencies (n) and percentages (%) of participants. The normality of the variables was assessed and accepted using the Kolmogorov-Smirnov test. Differences in the consumption of nutritional supplements by age were determined by the χ^2 test. Moreover, if statistical differences were found, the odds ratio (OR) and its confidence interval (CI) were calculated. A multivariate general linear model was performed to assess the consumption of nutritional supplements by age and the influence of nutritional supplement consumption on dietary choices. Bonferroni-corrected significance levels for multiple comparisons were calculated. A P value <0.05 was considered our criterion for statistical significance for either a positive or negative difference. The Cohen d coefficient determined the magnitude of the differences: small effect ($d \leq 0.4$), moderate effect ($d = 0.41–0.7$), or large effect ($d \geq 0.7$) [25].

Results

Table 1 shows the characteristics of the study participants. The mean (SD) age of the players was 24.6 (4.20) y, and their body mass index was within the normal range. Table 2 shows the consumption of SSs by age in the population of female football players.

Table 1
Characteristics of the sample

Characteristic	Mean (SD) or n (%) (N = 126)	Range
Age, y	24.6 (4.2)	15.9–34.4
Height, cm	165.0 (6.0)	153.0–180.0
Weight, kg	60.6 (6.7)	46.4–80.0
BMI, kg/m ²	22.2 (1.8)	18.5–27.9
Training week sessions	4.76 (1.1)	3.0–9.0
Session duration, h		
1.0–1.5	13 (10.3%)	–
1.5–2.0	97 (77.0%)	–
2.0–2.5	16 (12.7%)	–
Competition level		
Primera Iberdrola (First League)	26 (20.6%)	–
Reto Iberdrola (Second League)	100 (79.4%)	–

BMI, body mass index.

In total, 90.5% of the sample was in favor of the use of supplements, 84.1% of the players consumed supplements some of the time, and 58.7% reported that they were currently using supplements. The First League players reported having consumed more supplements than the Second League players (mean [SD], 4.2 [3.2] versus 2.7 [2.3]; $P = 0.008$). Among the main reasons for taking supplements, female players indicated improvement in both sports performance (68.3%) and health (34.1%). Regarding the timing and the moment of SS consumption, the players reported higher consumption

during training and competition (52.4%) and after sports practice (31%). Supplements were purchased primarily through the Internet (34.9%), in specialized shops (23.8%), and from dietitians (17.5%). The SS advisors most commonly identified were dietitian-nutritionists (56.3%) and physical trainers (26.2%). Finally, older players, compared with their younger counterparts, consumed more supplements during the data compilation ($P = 0.002$), primarily for health maintenance purposes ($P = 0.045$). These supplements were predominantly purchased online ($P = 0.027$).

Figure 1 shows differences in the self-perceived benefits of SS consumption. All players indicated that they obtained results from the use of the supplements (mean [SD] score, 3.7 [0.9] on a 0–5 scale), and those who reported they currently consume supplements during the study period showed the highest scores (4.0 [0.7] versus 3.2 [0.9]; $P < 0.001$). Furthermore, when age was considered, players who used supplements self-reported greater benefits, especially those who were older players ($P < 0.001$).

Table 3 shows the consumption of SSs according to the AIS supplement evidence classification. The SSs most consumed by the total sample were whey protein (30.2%), sports drinks (28.6%), creatine monohydrate (28.6%), sports bars (27.8%), and caffeine (27.8%). All these supplements are in group A, being supplements with solid scientific evidence. Older players had a higher consumption of vitamin complexes ($P = 0.013$), whey protein ($P = 0.003$) (OR, 3.4; CI, 1.5–7.7) (Group A), and meat protein and green tea ($P = 0.020$) (Group C), although only five players consumed them.

Table 2
Sport supplement consumption by female elite footballers

	Participants, n (%)			P value
	Total sample (N = 126)	Age <24 y	Age >24 y	
Currently follows any type of diet or specific way of eating	72 (57.1)	32 (51.6)	40 (62.5)	0.107
In favor of using supplements for physical activity, within the law	114 (90.5)	55 (88.7)	59 (92.2)	0.172
Has ever taken any sport supplements	106 (84.1)	50 (80.6)	56 (87.5)	0.405
Currently takes sport supplements	74 (58.7)	30 (48.4)	44 (68.8)	0.002
To improve sport performance	86 (68.3)	18 (29.0)	22 (34.4)	0.793
To improve physical appearance	19 (15.1)	12 (19.4)	7 (10.9)	0.207
To take care of one's health	43 (34.1)	17 (27.4)	26 (40.6)	0.045
For health problems	8 (6.3)	4 (6.5)	4 (6.3)	0.998
Other reason	9 (7.1)	7 (11.3)	2 (7.1)	0.082
Period when sport supplements are consumed				0.610
Training	9 (7.1)	4 (7.8)	5 (9.8)	
Competition	7 (5.6)	6 (11.8)	1 (2.0)	
Training and competition	66 (52.4)	29 (56.9)	37 (72.5)	
Holiday period	0 (0)	0 (0)	0 (0)	
All of the above	17 (13.5)	10 (19.6)	7 (13.7)	
Other	3 (2.4)	2 (3.9)	1 (2.0)	
Time of day when sport supplements are consumed				0.064
Before sports practice	19 (15.1)	15 (28.8)	4 (7.8)	
During sports practice	5 (4.0)	3 (5.8)	2 (3.9)	
After sports practice	39 (31.0)	15 (28.8)	24 (47.1)	
All of the above	23 (18.3)	9 (17.3)	14 (27.5)	
Indifferently or other	17 (13.5)	10 (19.2)	7 (13.7)	
Where supplements are purchased				
On the Internet	44 (34.9)	17 (27.4)	27 (42.2)	0.027
Pharmacy	14 (11.1)	10 (16.1)	4 (6.3)	0.086
Supermarket	12 (9.5)	7 (11.3)	5 (7.8)	0.752
From a dietitian-nutritionist	22 (17.5)	14 (22.6)	8 (12.5)	0.152
From a fitness trainer	5 (4.0)	2 (3.2)	3 (4.7)	0.650
Provided by the club or sponsor	19 (15.1)	13 (21.0)	6 (3.4)	0.077
Specialized shop	30 (23.8)	11 (17.7)	19 (29.7)	0.084
Person who advised taking sport supplements				
Dietitian-nutritionist	55 (56.3)	28 (45.2)	27 (42.2)	0.844
Coach	4 (3.2)	2 (3.2)	2 (3.1)	0.295
Teammate	16 (12.7)	7 (11.3)	9 (14.1)	0.590
Doctor	7 (5.6)	5 (8.1)	2 (3.1)	0.244
Physical trainer	33 (26.2)	14 (22.6)	19 (29.7)	0.997
Other	22 (17.5)	12 (19.4)	10 (15.6)	0.809

The χ^2 test was used to compare groups; Bonferroni-corrected significance levels for multiple comparisons were calculated; $P < 0.05$ was considered significant.

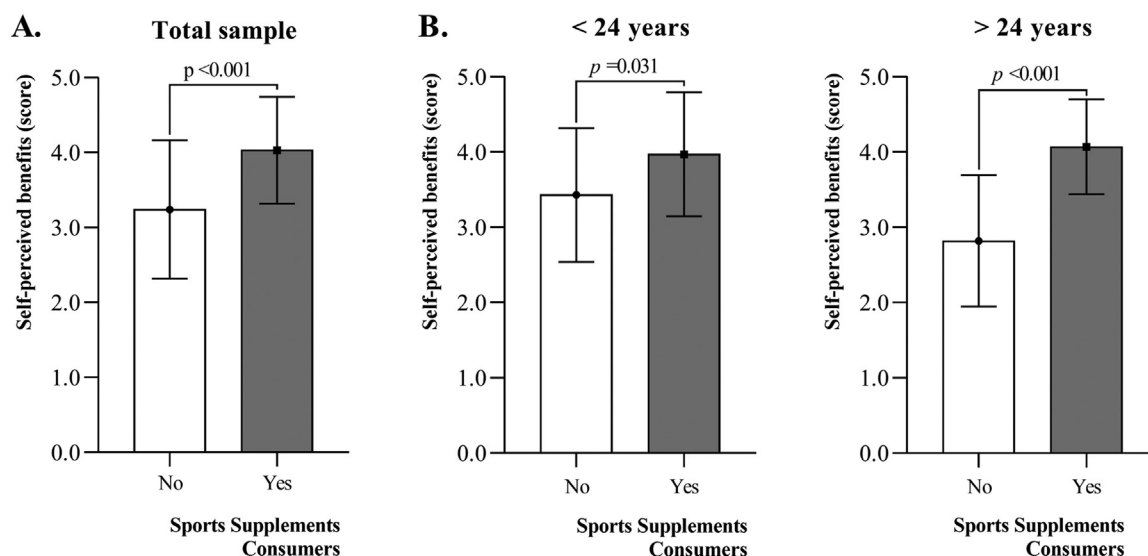


Fig. 1. Differences in reported self-perceived benefits of sports supplement consumption in (A) the total sample and (B) by age groups.

In contrast, younger players had a higher consumption of sports bars ($P = 0.021$) (Group A).

Table 4 shows differences between food choices in relation to the consumption of SSs among female football players. Players who consumed SSs reported greater awareness of the nutritional characteristics of foods and knowledge about health and nutrition, weight control, and performance benefits (all $P \leq 0.008$; effect size ≥ 0.523).

Discussion

The objective of this study was to determine the prevalence of supplement use among elite female football players. Although there have been studies analyzing the use of supplements in football [18–20,26], this is, to our knowledge, the first study to

specifically examine the consumption of supplements in elite female footballers while considering their dietary choices. Of the surveyed players, 90.5% favored supplement use, primarily to enhance sports performance and improve health during training and competition. The Internet was the primary source of purchase, and qualified dietitian-nutritionists and physical trainers were the main advisors. Players mostly consumed supplements that had strong scientific evidence supporting their use. Interestingly, players using supplements were more likely to make informed food choices based on nutritional content, health and nutrition knowledge, weight control, and performance benefits. This finding highlights the widespread use of SSs in sports such as football.

Previous literature has examined the reasons for athletes' supplement consumption and its prevalence. The primary motive for athletes taking supplements is the pursuit for enhanced athletic

Table 3
Prevalence of sport supplement consumption, based on the level of evidence reported by the AIS [12]

	Total sample, n (%) (n = 126)	Age <24 y, n (%) (n = 62)	Age >24 y, n (%) (n = 64)	P value	OR (CI)
Group A evidence					
Sports foods					
Whey protein	38 (30.2)	11 (17.7)	27 (42.2)	0.003	3.4 (1.5–7.7)
Sport drink	36 (28.6)	21 (33.9)	15 (23.4)	0.198	0.6 (0.5–1.1)
Sport bars	35 (27.8)	23 (37.1)	12 (18.8)	0.021	0.4 (0.2–0.9)
Performance supplements					
Creatine (monohydrate)	36 (28.6)	16 (25.8)	20 (31.3)	0.503	1.3 (0.6–2.8)
Caffeine	35 (27.8)	19 (30.6)	16 (25.0)	0.483	0.7 (0.3–1.6)
Medical supplements					
Iron	16 (12.7)	10 (16.1)	6 (9.4)	0.259	0.5 (0.2–1.6)
Vitamin D	16 (12.7)	10 (16.1)	6 (9.4)	0.259	0.5 (0.2–1.6)
Group B evidence					
Antioxidants					
Vitamin C	18 (14.3)	9 (14.5)	9 (14.1)	0.943	0.9 (0.3–2.6)
Group C evidence					
Magnesium	18 (14.3)	10 (16.1)	8 (12.5)	0.564	0.7 (0.3–2.0)
BCAA	14 (11.1)	6 (9.7)	8 (12.5)	0.618	1.3 (0.4–4.1)
Group D evidence					
Glutamine	9 (7.1)	4 (6.5)	5 (7.8)	0.769	1.2 (0.3–4.8)
Others	9 (7.1)	7 (11.3)	2 (3.1)	0.076	0.2 (0.1–1.2)

AIS, Australian Institute of Sport; BCAA, branched-chain amino acid; CI, confidence interval; OR, odds ratio.

Differences in the consumption of nutritional supplements by age were determined by the χ^2 test; Bonferroni-corrected significance levels for multiple comparisons were calculated; $P < 0.05$ was considered statistically significant for either a positive or negative difference.

Table 4

Differences in food choices with respect to supplement consumption in female football players.

	Non-consumers (n = 52)		Consumers (n = 76)		Mean diff.	p Value	Cohen's d
	Mean	SD	Mean	SD			
Nutritional characteristics	3.18	0.59	3.64	0.55	-0.454	0.001	0.866
Emotional influences	2.39	0.77	2.33	0.59	0.055	0.517	0.126
Knowledge about health and nutrition	3.56	0.73	4.09	0.56	-0.530	0.001	0.745
Influence of others	2.53	0.77	2.36	0.60	0.173	0.166	0.270
Usual eating habits	3.67	0.78	3.51	0.61	-0.162	0.618	0.089
Weight control	3.40	0.82	3.82	0.71	-0.418	0.008	0.523
Food principles and beliefs	1.89	0.66	1.76	0.79	0.132	0.578	0.109
Sensory attraction	3.44	0.56	3.67	0.79	-0.227	0.061	0.375
Sports performance	3.81	0.83	4.46	0.52	-0.649	0.001	0.885

n = 126. The multivariate general linear model was used to compare between non-consumers and consumers. Bonferroni-corrected significance levels for multiple comparisons were calculated. Cohen's *d* coefficient determined the magnitude of the differences. A *p*-value less than 0.05 was considered statistically significant.

performance. Health and physical appearance are also considered potential reasons, although to a lesser degree [27,28]. Our study found that the main reason for supplement consumption was to improve sports performance (68.3%), with a significant percentage of players also citing health improvement as the primary factor (15.1%). This aligns with a recent study involving elite female football players in an international tournament, where health was the leading reason for supplement use (66%) [26].

Our results revealed that 90.5% of the sample supported the SS use, with 84.1% having consumed nutritional supplements at some point. Similar findings were reported by Oliveira et al. [26], who found that 82% of female football players in a championship favored SS use. These findings suggest that despite the high demands of high-level sports and the pursuit of performance improvement, health remains an important motive. Thus, athletes should take into account both performance and health when making decisions about supplement use.

Age is a significant factor in supplement consumption and use; athletes consume more supplements as they get older [10]. Our study, consistent with Garthe et al. [16], observed that older female elite football players consumed more nutritional supplements, particularly those supported by strong scientific evidence [29]. However, motives for supplement use, except for health maintenance purposes, did not have notable differences based on age. Older players tended to consume vitamin complexes and whey protein, whereas younger players favored energy bars [16]. The higher supplement intake among older players could be related to their sporting experience or access to information about scientifically supported supplements (AIS Group A). Interestingly, age did not prove to be a determining factor in supplement consumption when motives were analyzed, challenging the assumption that older athletes might be more concerned about supplements because of career limits attributable to age.

The AIS SS classification system has allowed the ranking of supplements based on scientific evidence and a reduction of doping risks in sport [12]. Sports drinks and sport bars are commonly consumed supplements, providing high-energy macronutrients, particularly carbohydrates, for high-performance athletes [10]. In our study, the SSs most consumed by female footballers were all from AIS group A (robust scientific evidence). Approximately one-third of the sample consumed sports bars, sports drinks, caffeine, creatine monohydrate, and whey protein. Caffeine has shown ergogenic effects in women's handball and football, including distance covered and running speed during a match [30,31]. Creatine monohydrate supplementation has demonstrated significant benefits for actions of high intensity and intermittent effort, similar to those required in football [32,33]. Whey protein, known for its rapid absorption and performance benefits provided by stimulation of

protein synthesis after endurance exercise, was also highly consumed by players in this study [34]. From our findings, it could be deduced that supplements with the most information or scientific backing are those that end up being consumed the most. Interestingly, despite the importance of iron for women's sports performance, our study revealed surprisingly low consumption of iron supplements, even among the youngest players, despite high iron deficiency—attributable to menstrual cycles and highlighting players with heavy menstrual bleeding—reported among female football players [20,35].

In our study, players who used SSs showed greater concern for food's nutritional food characteristics, health and nutrition knowledge, weight control through diet, and potential sports performance benefits, similar to findings of a study by Thurecht et al. [24] among high-performance athletes. This highlights the significance of knowledge for maximizing benefits, not only from supplements but also from one's daily diet. Other studies have indicated that food choices in weight-category sports are influenced by nutritional attributes and weight control, particularly before and during international events [36]. To gain a deeper understanding, future research should explore supplement use and consumption in other women's team sports and various competitive levels, considering factors such as the social and physical food environment, sport or team culture, competition phase, and athlete experience [37]. The increasing professionalization of women's sports makes such investigations essential to meet the rising demands.

The present study was not without limitations. First, most of the players who took part in the study belonged to the Second League, which makes it difficult to extrapolate the results to the First League. Although the primary researcher was available to participants throughout the data collection process for any questions they may have had, the data obtained were based on the honesty, recall, and accuracy of the players' self-reports administered online; in-person surveys could have allowed us to be more certain about the players' responses to the questionnaire. It is also possible to remark on the lack of information on dietary and nutritional intake among younger players, together with the absence of research or studies exclusively on women in a sport as demanding as football. Finally, another limitation to highlight was that the results were collected only once throughout the season, thus preventing collection of information on variations in both the reason for the intake of supplements and the number of types of nutritional supplements consumed.

Conclusions

A high prevalence of female elite football players took some SSs and were in favor of using them. More than half of the players

mainly consumed SSs with the strongest scientific evidence. Age was shown to be a conditioning factor in the consumption of certain supplements, revealing variations in health-related use across different age groups. The consumption of SSs was mostly associated with sports practice, both in training and in competition, and the reasons for using supplements were to enhance sports performance and improve health, motivated by a qualified dietitian and nutritionist or by physical trainers. Interestingly, in terms of food choices, players who consumed supplements had more consideration about the nutritional characteristics of food and more knowledge about health and nutrition, weight control with the help of food, and the performance benefits they could acquire.

Perspective

The present study provides valuable insights into the use of SSs by female elite football players. The findings suggest that these players have a notable inclination toward supplement consumption, aligning with the limited prior research available in elite women's football. This evidence shows lower consumption among women compared with their male counterparts and considerable heterogeneity in consumption. The main reasons for supplement use are sports performance and athlete health. This highlights the necessity for tailored nutritional advice in women's sports, considering the level of evidence and suitability of each supplement throughout the season. Future research with larger samples, including players from different nationalities, competitive levels, and various points of the season, is necessary to enhance the understanding of supplement use in elite women's football.

Declaration of Competing Interest

The authors declare no conflict of interest.

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