





Dietary intake and compliance with UEFA nutrition guidelines in soccer players

-  **Jaume Giménez-Sánchez**  . Faculty of Health Sciences. University of Barcelona, Campus Bellvitge. Barcelona, Spain.
-  **Luis Melda de Oleo-Ogando**. Master's Program in Nutrition for Physical Activity and Sport. University of Barcelona. Barcelona, Spain.
-  **Magaly del Rosario Muciño-Arellano**. Master's Program in Nutrition for Physical Activity and Sport. University of Barcelona. Barcelona, Spain.

ABSTRACT

Soccer is a high-intensity sport characterized by a combination of explosive efforts and prolonged aerobic activity. Nutrition is a key factor in optimizing performance. The objective of this study was to assess the nutritional intake of professional soccer players and the degree of compliance with nutritional recommendations of the Union of European Football Associations (UEFA) and organizations such as the European Food Safety Authority (EFSA). A cross-sectional observational study was conducted involving 26 players aged 16 to 34 who were in training. Dietary analysis was performed using EasyDiet® software, and data were processed with the Statistical Package for the Social Sciences (IBM SPSS Statistics). The normality of the variables was assessed, and means, standard deviations, and ranges were determined; a frequency analysis was conducted to establish the proportion of compliance with certain macronutrients. The results showed that the players evaluated had an energy intake below the recommended level, accompanied by an insufficient intake of carbohydrates; protein intake was generally adequate or above established recommendations, while fat intake remained within acceptable ranges, even exceeding the recommended value. An imbalance in micronutrients was observed, with low intakes of vitamin A and D, and high consumption of calcium, iron, sodium, and other micronutrients.

Keywords: Sport medicine, Performance analysis, Dietary requirements UEFA, Macronutrients, Micronutrients, Athletic performance.

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 **Corresponding author.** Faculty of Health Sciences. University of Barcelona, Campus Bellvitge. Barcelona, Spain.

E-mail: jaumegimenez@ub.edu

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INTRODUCTION

Soccer is a sport played by both men and women and is considered a high-intensity activity that combines explosive movements such as sprints, jumps, and changes of direction with long periods of moderate-intensity aerobic activity. Increasingly, the sport faces greater physical and technical demands, coupled with the growing economic implications of winning or losing a match (Amawi et al., 2024; Mohr et al., 2022; Sebastián-Rico et al., 2023). Due to the high-intensity physical exertion of this sport and the goal of optimizing the quality of play, adjusting energy and dietary intake is necessary to achieve optimal performance (Amawi et al., 2023), as adherence to recommended nutritional practices for this sport influences multiple bodily processes, from energy production to post-exercise recovery (Amawi et al., 2024).

The physiological demands placed on each player result in a high energy and metabolic load, not to mention the stress to which the musculoskeletal system is subjected; consequently, nutrition is a determining factor in in-game performance, post-game recovery, and the prevention and rehabilitation of injuries that may occur in players (Amawi et al., 2024; Mohr et al., 2022). This implies high demands on both the aerobic and anaerobic systems to achieve optimal performance. During competition, anaerobic glycolysis and carbohydrate oxidation are fundamental sources of energy, and it has been observed that muscle glycogen can be depleted after matches to approximately 43% of pre-match levels, remaining significantly reduced in the hours that follow (Hulton et al., 2022). This energy depletion highlights the importance of adequate preparation for soccer players, both from a training and nutritional standpoint, to effectively meet energy requirements (Iblasi et al., 2025).

Each player's nutritional needs are determined by the intensity, volume, and objectives of training, as well as by the frequency of competition, which requires a diet balanced in both quantity and quality (Amawi et al., 2024). It has been suggested that current competition schedules increase the risk of injury. Added to this is the fact that match schedules are variable, designed to accommodate the needs of television broadcasts and an audience constantly tuned in to the TV. This means that players are subjected to constant domestic and international travel, posing an even greater challenge to the body (Collins et al., 2021).

Various studies and meta-analyses have shown that soccer players frequently fail to meet energy and carbohydrate recommendations (Amawi et al., 2024; Iblasi et al., 2025; Jenner et al., 2019; Macuh et al., 2022; Sebastián-Rico et al., 2023; Steffl et al., 2019). Protein intake is often higher than recommended, while fat intake is generally adequate, though in some cases it may be slightly high (Iblasi et al., 2025; Sebastián-Rico et al., 2023; Steffl et al., 2019). In addition, several micronutrients, such as vitamin D, vitamin K, and potassium, are below recommended levels, while sodium is consumed in excess (Iblasi et al., 2025). These dietary imbalances can compromise recovery, performance, and training capacity, highlighting the need for specific nutritional monitoring (Iblasi et al., 2025; Jenner et al., 2019; Steffl et al., 2019).

An energy intake that is unbalanced in macronutrients can compromise adaptations to training and recovery processes. Inadequate energy intake can decrease performance and increase the risk of changes in body composition, such as a decrease in fat-free mass, potentially compromising immune function and bone health, increasing susceptibility to injuries, and symptoms related to overtraining (Amawi et al., 2024; Jenner et al., 2019).

That is why, in 2017, the steering committee of the current UEFA Nutrition Expert Statement (JC; RM, JB, AMcC) undertook the task of compiling an expert panel statement with the aim of updating, based on evidence, all existing knowledge and research on nutrition in professional soccer. The most recent

compendium includes nine key sections covering all participants in a match: field players, goalkeepers, and referees, taking into account both men and women. The topics included are: match-day nutrition, training-day nutrition, body composition, stressful environments and travel, cultural diversity and dietary considerations, dietary supplements, rehabilitation, referees, and elite youth players (Collins et al., 2021).

Although previous studies have consistently reported inadequate energy and carbohydrate intake among soccer players, relatively few have simultaneously evaluated compliance with both football-specific macronutrient recommendations and a comprehensive micronutrient profile using the most recent UEFA and EFSA reference standards. Therefore, the objective of this study was to assess the nutritional intake of professional and semi-professional soccer players and determine the degree of compliance with current recommendations for energy, macronutrients, and micronutrients. The novelty of this work lies in its integrated evaluation of dietary adequacy using updated reference frameworks, allowing a more comprehensive characterization of nutritional practices and the identification of nutritional priorities that may support individualized dietary interventions, nutritional periodization, and performance optimization in soccer players.

MATERIAL AND METHODS

A cross-sectional observational study to assess the dietary intake of professional and semi-professional soccer players in Spain during the 2025–2026 period.

Participants

A selection of 26 active professional and semi-professional soccer players was made from the sports nutrition service. The players' ages ranged from 16 to 34 years ($n = 26$; age 21.5 ± 4.7 years; body weight 72.9 ± 9.4 kg; height 179.8 ± 7.1 cm; body mass index (BMI) 22.5 ± 2.3 kg/m²), and they were of Spanish or Latin American nationality. All players who, at the time of data collection, had any medical condition or were injured were excluded.

Procedures

Dietary intake was assessed using a one-hour structured interview. Each subject was asked to provide a detailed description of their food intake using a 72-hour recall. To collect data on food intake, DIN A3-sized food photographs were used, based on the Food Exchange System for Dietary Planning and Menu Design (Marques-Lopes et al., 2018), thereby ensuring greater accuracy in intake assessment.

Dietary analysis

A single researcher performed the analysis of total dietary intake, measuring variables such as energy, macronutrient, and micronutrient intakes. The data were entered and analysed using the EasyDiet® software from the Spanish Academy of Nutrition and Dietetics S.L.U. 2026.

The comparison of the data obtained during data collection was performed based on the variables to be analysed. Intake of energy, protein, carbohydrates, fat, calcium, and iron was compared with the specific recommendations for professional soccer players established by UEFA in 2021. Sugar, fibre, and other micronutrients (sodium, potassium, magnesium, phosphorus, zinc, vitamin A, vitamin D, vitamin E, thiamine, riboflavin, niacin, vitamin B6, folate, vitamin B12, and vitamin C), for which reference values are not determined by this organization, were compared with those described by the EFSA and updated in 2019 for the general population.

Statistical analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences (IBM SPSS Statistics) version 31.0.1.0 (49).

The normality of the variables was assessed using the Shapiro-Wilk test, with a p -value $> .05$ considered indicative of a normal distribution. The variables representing the sample characteristics that exhibited a normal distribution were body weight and height, while age and BMI did not meet this criterion.

Regarding energy and macronutrient values such as total protein (animal and plant protein), fats (saturated and monounsaturated fatty acids), carbohydrates, and fibre, these followed a normal distribution. Those that did not fall within this category were the values for polyunsaturated fatty acids and sugar.

As for micronutrient intake: magnesium, phosphorus, zinc, thiamine, riboflavin, niacin, and vitamin B12 showed a normal distribution, while sodium, potassium, vitamins A, D, E, B6, folate, and C did not.

Descriptive statistics were calculated: minimum (min) and maximum (max), mean (x) \pm standard deviation (SD). Although some variables did not strictly meet the normality criterion, the data are presented as mean and standard deviation to facilitate interpretation and comparison with previous studies. In addition, a frequency analysis was performed for certain variables (proteins, carbohydrates, and fats) to establish the proportion (%) of values falling within the reference ranges.

RESULTS

Sample

Of the 26 male soccer players, physical characteristics such as age, weight, height, and BMI, obtained from the medical histories in the participants' clinical records, are described. The mean values, along with the minimum and maximum ranges, are presented in Table 1.

Table 1. Characteristics of the participants.

Variable (n = 26)	Mean \pm SD	Range (Min-Max)
Age (years)	21.5 \pm 4.7	16–34
Body weight (kg)	72.9 \pm 9.4	53–92
Height (cm)	179.8 \pm 7.1	165–192
BMI (kg/m ²)	22.5 \pm 2.3	17.3–27.2

Note. SD = Standard Deviation; Min = Minimum; Max = Maximum; BMI = Body Mass Index.

Nutrient intake according to UEFA 2021 recommendations

The average energy intake was 2,700.2 \pm 520.6 kcal/day, equivalent to 77.2% compliance with the minimum recommendation established by UEFA (3,500 kcal/day). This intake corresponded to 37.6 \pm 8.8 kcal/kg/day. The energy distribution showed 25.7% coming from protein, 40.4% from carbohydrates, and 33.9% from fat, with the latter falling within the upper limit established by the UEFA's (20–35% of total kcal) (Collins et al., 2021) (Table 2).

The average total protein intake was 171.4 \pm 40.6 g/day, equivalent to 2.4 \pm 0.6 g/kg/day, which is slightly above the range recommended by UEFA of 1.6–2.2 g/kg/day (Collins et al., 2021). Of the total protein consumed, 79.1% came from animal sources (136.3 \pm 37.6 g/day), while 20.9% came from plant sources (35.1 \pm 14.6 g/day) (Table 2).

An average carbohydrate intake of 274.3 ± 78.6 g/day was calculated, equivalent to 3.9 ± 1.4 g/kg/day, a value that falls at the lower limit of the range recommended by UEFA (3–8 g/kg/day) (Collins et al., 2021).

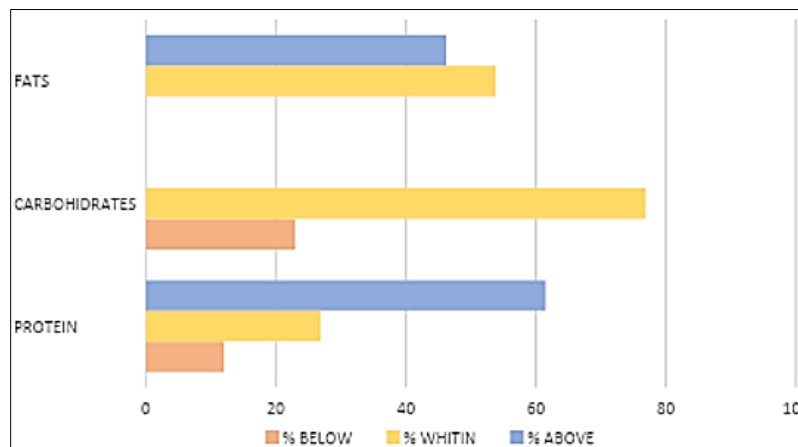
The average fat intake was 101.9 ± 27.2 g/day, equivalent to 1.4 ± 0.4 g/kg/day. The distribution of saturated, monounsaturated, and polyunsaturated fatty acids was 8.7%, 16.8%, and 5.2% of total kcal, respectively (Table 2).

Table 2. Energy and nutrient intake of soccer players (n = 26) compared with UEFA standards.

Variable	Mean \pm SD	Recommendation
Energy		
kcal/day	2700.2 \pm 520.6	3500 kcal/day UEFA
kcal/kg/day	37.6 \pm 8.8	
% compliance	77.2 \pm 14.9	
Protein		
g/day	171.4 \pm 40.6	1.6–2.2 g/kg/day UEFA
g/kg/day	2.4 \pm 0.6	
% of total kcal	25.7 \pm 5.8	
Animal protein		
g/day	136.3 \pm 37.6	
% total protein	79.1 \pm 8.1	
Plant-based protein		
g/day	35.1 \pm 14.6	
% total protein	20.9 \pm 8.1	
Carbohydrates		
g/day	274.3 \pm 78.6	3–8 g/kg/day UEFA
g/kg/day	3.9 \pm 1.4	
% of total kcal	40.4 \pm 7.5	
Fat		
g/day	101.9 \pm 27.2	20–35% of total kcal UEFA
g/kg/day	1.4 \pm 0.4	
% of total kcal	33.9 \pm 6.1	
AGS		
g/day	26.5 \pm 9.5	
% of total kcal	8.7 \pm 2.3	
AGM		
g/day	50.5 \pm 16.8	
% of total kcal	16.8 \pm 4.6	
AGP		
g/day	15.5 \pm 5.8	
% of total kcal	5.2 \pm 1.9	

Note. Values are expressed as mean \pm SD (Standard Deviation); SFA = Saturated Fatty Acids; MUFA = Monounsaturated Fatty Acids; PUFA = Polyunsaturated Fatty Acids.

Regarding the distribution of players' macronutrient intake based on UEFA's 2021 nutritional recommendations, 26.9% of them had a protein intake within the recommended range (1.6–2.2 g/kg/day), while 61.5% of the athletes exceeded that range. For carbohydrates, 76.9% of soccer players fell within the recommended range (3–8 g/kg/day), while 23.1% had a lower intake. Regarding fats, 53.8% of the players met the recommended range, and 46.2% had values above the recommended range (20–35% of total kcal) (Collins et al., 2021) (Figure 1).



Note. All data are presented as percentages (%).

Figure 1. Distribution of soccer players according to macronutrient intake relative to UEFA recommendations (n = 26).

Regarding the micronutrient profile, the athletes showed an average intake of calcium and iron above the values recommended by UEFA 2021 (Collins et al., 2021). See Table 3 for adequacy percentages.

Table 3. Micronutrient intake compared to UEFA guidelines.

Variable (n = 26)	Mean ± SD	Range (Min-Max)
Calcium (mg/day)	842.7 ± 381.7	326–1619
% Adequacy	120.4 ± 54.4	47–231
Iron (mg/day)	17.3 ± 5.7	8–30
% Adequacy	199.8 ± 65.9	91–340

Note. Values are expressed as mean ± SD and range from Min-minimum to Max-maximum.

Nutrient intake according to EFSA 2019 recommendations

As part of the carbohydrate analysis, the intake of free sugars was measured; the average intake was 94.7 ± 55.3 g/day, representing 13.9% of total kcal, exceeding the maximum value recommended by EFSA (<10% of total kcal). The average fibre intake was 25.6 ± 13.2 g/day, which corresponded to 102.6% of the EFSA recommendation (25 g/day) (Authority (EFSA), 2017) (Table 4).

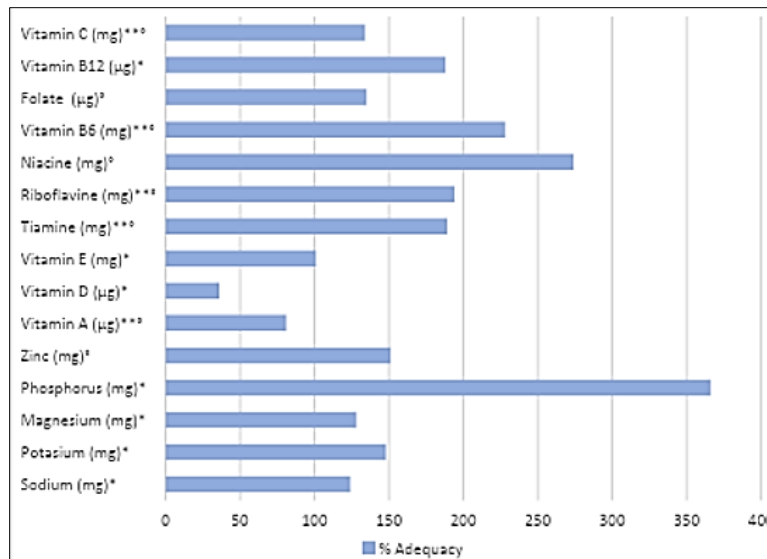
Table 4. Sugar and fibre intake of the players (n = 26) according to EFSA recommendations.

Variable	Mean ± SD	Recommendation
Sugar		
g/day	94.7 ± 55.3	
% of total kcal	13.9 ± 6.9	<10% of total kcal (EFSA)
Fiber		
g/day	25.6 ± 13.2	25 g/day (EFSA)
% compliance	102.6 ± 52.9	

Note. Values are expressed as mean ± SD (Standard Deviation).

The mean intake of vitamin A and vitamin D was found to be below the recommendations in the nutritional guidelines, while vitamin E was within the recommended value. Sodium, potassium, magnesium, zinc, folate, vitamin B12, and vitamin C were found to be slightly above the recommended value. Phosphorus, niacin,

and vitamin B6 were well above the values recommended by EFSA 2019 (Authority (EFSA), 2017). See Table 5 for mean intake, minimum, and maximum values. See Figure 2 for percentage of adequacy.



Note. *Adequate Intake (AI), **Average Requirement (AR), or Population Reference Intake (PRI).

Figure 2. Micronutrient intake among soccer players (n = 26), presented as a percentage of the EFSA Dietary Reference Values for Nutrients, 2019.

Table 5. Micronutrient intake compared to EFSA.

Variable (n = 26)	Mean ± SD	Range (Min-Max)
Sodium (mg)	2481.7 ± 1185.7	635.2 - 5228.5
Potassium (mg)	5178.2 ± 1828.7	2520.2–10820.4
Magnesium (mg)	449.1 ± 145.5	223.0–814.4
Phosphorus (mg)	2011.1 ± 454.5	1093.7–3274.4
Zinc (mg)	14.2 ± 3.8	5.7–21.4
Vitamin A (µg)	608.1 ± 522.4	106.5–2,241.3
Vitamin D (µg)	5.3 ± 5.5	0.0–20.5
Vitamin E (mg)	13.1 ± 5.3	7.3–32.2
Thiamine (mg)	2.0 ± 0.8	0.8–3.7
Riboflavin (mg)	3.1 ± 0.9	1.8–5.4
Niacin (mg)	45.9 ± 11.3	27.1–76.0
Vitamin B6 (mg)	3.8 ± 1.4	2.0–7.3
Folate (µg)	446.2 ± 230.7	159.1–1,139.9
Vitamin B12 (µg)	7.5 ± 2.9	2.1–13.8
Vitamin C (mg)	147.1 ± 122.4	34.0–545.4

Note. Values are expressed as mean ± SD and range (min–max).

DISCUSSION

Comparison of intake with UEFA recommendations

The main objective of this study was to assess the nutritional intake of professional soccer players and the degree of compliance with the recommendations on macronutrients and micronutrients established by UEFA and organizations such as the EFSA.

The players' mean spontaneous energy intake was 2700.2 ± 520.6 kcal/day, which is equivalent to 72.2% of UEFA's minimum recommendation of 3500 kcal/day (Collins et al., 2021). Similarly, the average intake relative to body mass was 37.6 ± 8.8 kcal/kg/day, which is below the 40–70 kcal/kg/day suggested for athletes exposed to high training volumes (Kerksick et al., 2018). These findings are consistent with previous studies reporting inadequate energy intake among soccer players (Anderson et al., 2017; Brinkmans et al., 2019; Devlin et al., 2017; Ebine et al., 2002; Iblasi et al., 2025). From a practical standpoint, this energy deficit may increase the risk of low energy availability (LEA), a condition associated with poor recovery, hormonal disturbances, reduced adaptation to training, increased risk of injury, and compromised performance throughout the season (Amawi et al., 2024; Jenner et al., 2019; Mountjoy et al., 2018; Sebastiá-Rico et al., 2023). Therefore, routine monitoring of energy intake and expenditure should be considered to identify at-risk players and implement individualized nutritional interventions.

Regarding macronutrient distribution, a high protein intake was observed, accounting for 26% of total energy intake, while carbohydrates accounted for 40% and fats for 34% of total kilocalories, with the latter falling at the upper limit of the range recommended by UEFA, which is 20–35% (Collins et al., 2021). This is a clear and common dietary pattern among soccer players, characterized by high consumption of protein—primarily of animal origin—and fat, with a relatively low intake of carbohydrates despite soccer's high energy demands during certain phases of the season (Anderson et al., 2016).

Although adequate protein intake supports muscle protein synthesis and recovery, chronically high intake can inadvertently displace carbohydrate-rich foods from the diet, especially when total energy intake is insufficient (Burke et al., 2019; Collins et al., 2021; Dobrowolski & Włodarek, 2019; Leão et al., 2022; Rocha-Rodrigues et al., 2021; Thomas et al., 2016). This finding is particularly relevant in soccer, where carbohydrates represent the primary substrate for high-intensity intermittent exercise. Consequently, nutritional advice should focus not only on achieving adequate protein intake but also on maintaining an appropriate balance between protein and carbohydrate consumption to promote both recovery and glycogen replenishment.

Animal-derived proteins accounted for 79.1% of total protein intake, confirming a dietary pattern previously described in soccer players (Mielgo-Ayuso et al., 2015). Although this pattern ensures an adequate supply of essential amino acids, it may reduce the diversity of plant-based foods and, consequently, limit the intake of dietary fibre, antioxidants, vitamins, minerals, and other bioactive compounds relevant to long-term health and recovery. From a practical standpoint, promoting a more balanced distribution between animal and plant-based protein sources could improve the overall quality of the diet, while maintaining adequate protein availability for performance and recovery.

Carbohydrate intake averaged 3.9 ± 1.4 g/kg/day, placing it at the lower limit of UEFA recommendations, although nearly a quarter of the players did not meet these values (Collins et al., 2021). Similar findings have been consistently reported in soccer players (Amawi et al., 2024; Iblasi et al., 2025; Jenner et al., 2019; Macuh et al., 2022; Sebastiá-Rico et al., 2023; Steffl et al., 2019). Given the central role of muscle glycogen in soccer performance, inadequate carbohydrate intake can lead to suboptimal glycogen stores, which could affect the ability to perform repeated sprints, performance in high-intensity runs, and recovery between training sessions and matches. These findings support the implementation of nutritional periodization strategies, with carbohydrate intake adjusted according to training and competition demands and increased around match days to optimize glycogen availability and recovery (Collins et al., 2021; Mohr et al., 2022, 2022; Pueyo et al., 2024).

Regarding fats, the average intake was 1.4 ± 0.4 g/kg/day, representing an average of 33.9% of total calories, with a fatty acid distribution showing that 8.7% of total calories came from saturated fats, 16.8% from monounsaturated fatty acids, and 5.2% from polyunsaturated fatty acids. Although the proportion of monounsaturated fatty acids was adequate, nearly half of the players (46.2%) exceeded the recommended range for total fat; it should be noted that no player fell below the range recommended by UEFA. Other studies have reported that, although the average total fat intake approaches the recommended upper limit, there is considerable individual variability, with some players exceeding the recommendations and others falling within the appropriate range (Macuh et al., 2022). Although fat is essential for the absorption of fat-soluble vitamins and the supply of essential fatty acids, excessive fat intake can contribute to a lower relative intake of carbohydrates when total energy intake is limited. Therefore, dietary planning should prioritize not only total fat intake but also its balance with carbohydrate needs according to training demands.

Comparison of micronutrients with UEFA recommendations

The results of this study on micronutrient intake confirm the importance of including them in the diet, as established by the UEFA statement and other studies in the scientific literature. Although this organization does not establish precise intake figures—and, in this regard, we must reiterate the importance of personalizing dietary intake—it does highlight certain vitamins and minerals as essential for soccer players: calcium and iron. A varied, healthy, and balanced diet should be sufficient to meet these needs before resorting to supplements, which aligns with the “*food first*” philosophy (Collins et al., 2021).

The mean calcium intake was 842.7 ± 381.7 mg/day, with a compliance rate of 120.4%. This result suggests adequate intake based on the reference value used, previous studies indicate that many athletes may still fall short of the optimal calcium intake for bone health and recovery. This is particularly relevant for athletes at risk of relative energy deficiency in sport (RED-S), in whom calcium requirements may increase to 1500 mg/day (Collins et al., 2021; Macuh et al., 2022). Therefore, calcium intake should be interpreted not only in relation to general reference values but also according to individual risk factors, energy availability, and training load.

The mean iron intake was 17.3 ± 5.7 mg/day, with a percentage of adequacy close to 200%, indicating that the players met and even exceeded established recommendations (Collins et al., 2021). This high iron intake can be partly explained by the predominance of animal protein sources, which provide heme iron. However, sufficient dietary intake does not always guarantee adequate iron status, as exercise-induced inflammation, sweating, gastrointestinal microbleeds, and other factors can negatively affect iron bioavailability (Ghazzawi et al., 2023; Turchaninov et al., 2015). Given that iron deficiency, even in the absence of anaemia, can limit aerobic capacity, recovery from fatigue, and performance—and considering its higher prevalence among female athletes—dietary assessment should be supplemented with periodic haematological monitoring, especially during periods of high training load or in players at higher risk.

Comparison with EFSA recommendations

Compared to EFSA recommendations, the average intake of free sugars accounted for 14% of total energy intake, exceeding the recommendation that sets a lower limit of 10% of total energy intake—a recommendation that the World Health Organization also classifies as evidence-based (Authority (EFSA), 2017; *Guideline*, 2015). This finding suggests a high presence of sugary foods in the players' diet, which could have negative implications for the nutritional quality of the diet; reducing free sugar intake should not necessarily involve reducing total carbohydrate intake but rather replacing low-quality sugar sources with carbohydrate-rich, nutrient-dense foods that promote glycogen availability and recovery.

The mean dietary fibre intake was 25.6 ± 13.2 g/day, representing approximately 102.6% of the EFSA recommendation of 25 g/day (Authority (EFSA), 2017). Although this indicates that the players met the minimum recommendation, intakes exceeding 30 g/day may provide additional benefits, especially in populations with higher energy demands (Mancin et al., 2025; Sommer et al., 2024). In sports contexts, adequate fibre intake can support gastrointestinal function, gut microbiota modulation, short-chain fatty acid production, immune function, and metabolic health, and may reduce perceived fatigue during training (Mancin et al., 2025; Zha et al., 2025). Therefore, fibre intake should be considered as part of overall dietary quality, while also being individually tailored to training and match schedules to prevent gastrointestinal discomfort.

Comparison of micronutrients with EFSA recommendations

Although nutritional periodization typically focuses on energy and macronutrient planning, many metabolic processes involved in performance, recovery, and adaptation also depend on adequate intake of vitamins and minerals (Beck et al., 2021; Jeukendrup, 2017; Volpe, 2007). In this study, all mean micronutrient intakes were established, and adequacy percentages were calculated based on the EFSA dietary reference values (Figure 2; Table 5).

Vitamin A and vitamin D showed adequacy rates of 81.1% and 35.6%, respectively, suggesting an insufficient intake of these fat-soluble vitamins, consistent with previous reports in soccer players (Beck et al., 2021; Bezuglov et al., 2023; Collins et al., 2021; Mancin et al., 2025; Nikniaz et al., 2021). Given their role in muscle function, immune health, recovery, and injury prevention, the observed low intake could warrant routine monitoring of vitamin D status. Early identification of vitamin D deficiency could facilitate targeted nutritional interventions and, potentially, improve player availability throughout the season.

In contrast, sodium, potassium, magnesium, zinc, folate, vitamin B12, and vitamin C showed intakes slightly higher than recommended, while phosphorus, niacin, and vitamin B6 are consumed in considerably higher amounts, reaching up to twice the reference values. These findings suggest that, although recommendations are met, there is a tendency among players toward high consumption of certain nutrients, which may reflect their usual diet or result from dietary strategies for athletic preparation.

This study suggests that the soccer players evaluated had a spontaneous dietary intake that, although it largely met micronutrient requirements, showed significant deficits in total energy and carbohydrate intake, along with a high-protein pattern and a fat intake close to the recommended upper limit. Furthermore, the consistent presence of deficiencies in fat-soluble vitamins and relative excesses of certain micronutrients highlights that quantitative compliance with recommendations does not guarantee the functional adequacy of the diet when non-athlete-specific reference values are applied. These findings reinforce the need for individualized and periodized nutritional strategies, aligned with training and competition loads, as well as routine monitoring of key nutrients and biomarkers, particularly vitamin D, iron, calcium, and indicators related to low energy availability. Such strategies can help optimize players' performance, recovery, and availability throughout the competitive season.

Among the limitations of this study is the small sample size ($n = 26$), which may affect the external validity of the findings and their generalizability to other populations of soccer players. Furthermore, the small number of participants limits the ability to identify potential differences among subgroups of interest, such as playing position, age group, competitive level, or different phases of athletic training—factors that could significantly influence nutritional requirements and dietary patterns.

Furthermore, the cross-sectional design provides only a snapshot of dietary intake at a specific point in time, without allowing for the evaluation of changes throughout the season or the establishment of causal relationships between nutritional intake and variables related to athletic performance.

Although the 72-hour dietary recall is a widely used tool in nutritional research, it relies on participants' memory and the accuracy of their self-reports; therefore, memory errors, underreporting, or overestimation of food intake cannot be ruled out here. Although the use of standardized photographs helped improve portion size estimation, the possibility of measurement errors remains. Furthermore, the interpretation of the observed energy deficits should be analysed with caution, as direct measurements of energy expenditure, training load, or competitive exposure were not available to allow for individualized contextualization of the players' nutritional requirements. Finally, the lack of specific biomarker measurements prevents us from determining whether the reported dietary inadequacies translated into actual physiological deficiencies.

A conceptual limitation of this study is the use of EFSA reference values to assess certain nutrients, due to the absence of specific recommendations for soccer players from UEFA. Although these values constitute a widely recognized and used reference framework, they were developed for the general population and may not fully reflect the physiological demands associated with training and sports competition. Consequently, the adequacy percentages observed differ because athletes' nutritional requirements differ from those established for the general population. This highlights the need to develop specific recommendations for athletic populations to enable a more accurate assessment of nutritional education.

CONCLUSIONS

In conclusion, this study demonstrated that the players' spontaneous dietary intake did not meet the energy recommendations established by UEFA; furthermore, carbohydrate intake was insufficient to meet the minimum requirements for training, and even less so during competition. In contrast, the players' protein and fat intake levels aligned with the recommendations, even exceeding the recommended limits in some cases. The average intake of free sugars and dietary fibre exceeded the EFSA recommendation. The average intake of calcium and iron was above the values recommended by UEFA; meanwhile, vitamin A and D levels did not meet the EFSA's nutritional recommendations. The remaining micronutrients were slightly above the recommendations, and in some cases, the values were nearly double the recommended amounts.

AUTHOR CONTRIBUTIONS

All authors meet the criteria for authorship in accordance with established ethical guidelines. Jaime Giménez-Sánchez: Conceptualization, methodology, study supervision, data analysis and interpretation, manuscript drafting, critical revision of the manuscript, and final approval of the submitted version. Luis Melda de Oleo-Ogando: Data collection, dietary assessment, literature review, support in data analysis, manuscript drafting, and critical revision of the manuscript. Magaly del Rosario Muciño-Arellano: Data collection, data organization, support in data analysis and interpretation, preparation of tables and figures, manuscript revision, and final approval of the submitted version. All authors have critically reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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CONFLICT OF INTEREST

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AI USE DISCLOSURE

In accordance with current publishing ethics and transparency recommendations, artificial intelligence (AI) tools were used solely to assist with translation and language editing, with the aim of improving clarity and readability. No AI tools were used in the generation of scientific content, including the study design, data collection, analysis, interpretation of results, or the formulation of conclusions. The authors retain full responsibility for the content of the manuscript and confirm its originality, integrity, and accuracy.

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