Analysis of Nutritional Habits in Spanish Schoolchildren Participating in Extracurricular Football

Análisis de los hábitos nutricionales en escolares españoles que practican fútbol en horario extraescolar

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Abstract

Introduction: Nutritional habits in children and adolescents are crucial in terms of athleticism and health. These habits, combined with regular sports practice, are promoted from the beginning of school and are strengthened throughout subsequent educational stages (Secondary Education and Baccalaureate).

Method: To analyze the nutritional status of children of training age who regularly play soccer. 174 soccer players participated, all males. The Krece Plus questionnaire was used to assess nutritional status.

Results: It was observed that 44% of young people had poor nutritional habits. No differences were found between the age groups divided into competitive categories (under-13, under-15, and under-18) or between playing positions (goalkeepers, defenders, midfielders, and forwards).

Conclusions: The main findings of the study show, firstly, that the athletes analyzed present deficiencies in their diet and, secondly, that their eating habits do not undergo significant changes throughout the different categories. Due to the age ranges analyzed, future researchers are urged to increase the sample size in order to find more remarkable findings.

Keywords: football, nutrition, adolescents, body composition, physical education.

Resumen

Introducción: Los hábitos nutricionales en niños y adolescentes es determinante términos deportivos y saludables. Estos hábitos unidos a la práctica deportiva habitual se promueven desde inicios de la edad escolar y se van fortaleciendo durante las siguientes etapas educativas (Educación Secundaria y Bachillerato).

Método: Analizar el estado nutricional en niños en edad de formación que practican habitualmente el deporte del fútbol. Participaron 174 jugadores de fútbol, todos del género masculino. Para evaluar el estado nutricional se utilizó el cuestionario Krece Plus.

Resultados: Se puede observar que un 44% de los jóvenes poseen unos hábitos nutricionales bajos. No se han encontrado diferencias entre los grupos de edad configurados en categorías de competición (infantil, cadete y juvenil) ni entre las posiciones de juego (porteros, defensas, centrocampistas y delanteros).

Conclusiones: Los principales hallazgos del estudio muestran en primer lugar, que los deportistas analizados presentan carencias en la dieta y, en segundo lugar, los hábitos de alimentación no sufren cambios significativos a lo largo del paso por las distintas categorías. Debido a los rangos de edad analizados, se insta a futuros investigadores aumentar la muestra para poder encontrar hallazgos más notables.

Palabras clave: fútbol, nutrición, adolescentes, composición corporal, educación física.

Introduction

In recent years, particularly due to longitudinal studies that are beginning to report their findings, the importance of adequate nutrition throughout the lifespan has become evident, being especially critical during periods of rapid physical growth. The application of this premise to the field of sports is indisputable. During childhood and adolescence, a balanced diet is essential not only to achieve optimal physical and intellectual development, but also because these are decisive stages for the establishment

of dietary habits which, once carried into adulthood, will significantly influence overall health status across the years (Scaglioni et al., 2022; Serra-Majem & Aranceta, 2004).

In contemporary society, dietary patterns shaped by the development of food industrialization processes and the widespread availability of products in developed countries have fostered an increasing trend toward overnutrition and, consequently, rising childhood obesity rates. Specifically, Mizia et al. (2021) reported that the diets of 90% of young participants in a study on nutritional habits were characterized by excessively low levels of healthy foods. This situation leads to a higher predisposition in adulthood to nutrition-related diseases such as obesity, hypertension, or atherosclerosis (Casimiro, 1999). Available epidemiological evidence confirms that overweight and obesity are risk factors for the development of chronic diseases among young populations. Consequently, obesity and overweight are consolidated as a major public health problem, particularly among adolescents and young people (Cummings et al., 2002; Cañete et al., 2003), reaching even epidemic proportions in children and adolescents, with approximately one-third of European children being overweight or obese (Halilagic et al., 2025).

Within this context, the scientific literature has introduced the concept of metabolic syndrome, understood as a cluster of factors that increase the likelihood of developing cardiovascular diseases and type 2 diabetes (Salas-Salvadó et al., 2014). These factors include hypertension, hyperglycemia, elevated triglycerides, low HDL cholesterol, and abdominal fat accumulation (García-García et al., 2008). In a study conducted among schoolchildren in Seville, García et al. (2011) reported that nearly 20% of children presented a risk of metabolic syndrome. The authors emphasized that, although this condition was traditionally associated with adults, the current obesogenic environment has significantly increased the risk at earlier ages. Specifically, George et al. (2021) found associations between diet and components of metabolic syndrome, highlighting that poor adherence to the Mediterranean diet increased the risk of several of its components.

Diet, combined with appropriate training, constitutes a key pillar for achieving sporting success at any stage of life (Onetti-Onetti, Álvarez-Kurogi, & Castillo Rodríguez, 2019). However, in adolescent and young athletes, nutrition takes on an even more critical role due to high energy demands arising both from physical exercise and the intense growth characteristic of late puberty (Vázquez-Espino et al., 2022). Nonetheless, various studies analyzing energy expenditure in exercise and its relationship with nutrient intake have revealed deficits compared with recommendations, particularly for minerals such as calcium, iron, and zinc. Energy imbalance and insufficient nutrient intake may have negative consequences for growth, health, and performance in both the short and long term (Volpe, 2007). For this reason, nutritional education targeting formative populations should prioritize the promotion of a balanced diet capable of supplying energy and essential nutrients in appropriate amounts (Juzwiak et al., 2008), as this will help prevent forms of malnutrition or diet-related noncommunicable diseases in the future (Scaglioni et al., 2022).

In the scientific literature, particularly within the Spanish context, one of the most frequently employed tools for assessing nutritional status in young populations is the Krece Plus test, validated by Serra-Majem et al. (2003) as a diagnostic instrument for evaluating the nutritional status of Spanish children and adolescents aged 4 to 14 years. This agile questionnaire determines nutritional risk based on affirmative responses given by participants to specific items. Several studies have applied this

tool across samples of adolescents with different age ranges. For example, González-Jiménez et al. (2013) worked with students aged 14–19 years; Navarro-Pérez et al. (2016) applied it to a group of school adolescents aged 9–18 years; and De-Rufino et al. (2014) focused on a sample aged 10–17 years. Similarly, Planas et al. (2002) carried out their research among secondary school students aged 13–15 years.

One of the most relevant items in the questionnaire concerns regular breakfast consumption, since this remains a persistent challenge among young populations. Indeed, a considerable proportion of adolescents consume inadequate breakfasts or skip this meal altogether, despite it being one of the main daily intakes and ideally covering at least 25% of daily nutritional requirements. The enKid study, conducted by Serra-Majem & Aranceta (2004), reported that 3.1% of children analyzed did not eat breakfast. More recently, Rodríguez-Negro et al. (2025), in their study with school-children, found gender differences in breakfast patterns, noting that 11-year-old boys skipped breakfast more frequently than girls.

The relationship between breakfast and both physical and intellectual performance has been the focus of numerous studies. Available evidence indicates that adequate breakfast intake is closely linked to short-term metabolic, neurological, and hormonal changes (Serra-Majem & Aranceta, 2004; Van Lippevelde et al., 2013). Thus, a balanced breakfast not only promotes a more harmonious distribution of dietary intake throughout the day but also helps reduce consumption of industrial pastries, sweets, and other unhealthy products. Likewise, the inclusion of fruits and vegetables in the diet constitutes a fundamental aspect of any nutritional analysis, being considered a key factor in promoting healthy habits both early in life and into adulthood (Calvo-Pacheco et al., 2014). The aim of this study is to assess the nutritional status of Spanish youth football players competing at an intermediate level and to analyze in detail the characteristics of their nutritional habits. Likewise, it is hypothesized that nutritional habits are closely associated with metrics related to body composition.

Methods

Design and Participants

A total of 174 male football players participated in the present study, both in body composition assessments and through completion of the nutritional habits' questionnaire. Of these, 34 belonged to the under-13 (U13) or Children's category (ages 11-13), 40 to the under-15 (U15) or Cadet category (ages 14-15), and 100 to the under-18 (U18) or Youth category (ages 16–18). Participants competed in different grassroots football leagues in Spain, within the Autonomous Community of Andalusia (five categories).

This study was approved by the Ethics Committee of the University of Málaga (Reg. No. 121-2024-H) and followed the anonymity guidelines established in the Declaration of Helsinki (2013).

Data collection took place during the first trimester (September–December), under standardized temperature (23–26 °C) and relative humidity (35–40%) conditions, thanks to the facilities provided by the sports clubs. All measurements were conducted in the late afternoon. The school-aged football players were at the beginning of the competitive season, following a vacation period of approximately six weeks, and had resumed regular training sessions three times per week, lasting 90 minutes each.

Instruments

For the assessment of nutritional status, the Krece Plus questionnaire, validated by Serra-Majem et al. (2003) for children and adolescents, was administered. This questionnaire consists of 16 items with dichotomous (yes/no) responses. Each item is scored with 0 points for a negative response, and +1 or –1 points for a positive response, depending on the item. The maximum possible score is +11, and the minimum is –5. Based on the results, individuals are classified into three categories (Serra-Majem et al., 2003):

High nutritional level (score ≥ 9)

Moderate nutritional level (score 6–8)

Low nutritional level (score ≤ 5)

Table 1

Scoring of items in the Krece Plus test (Serra-Majem et al., 2003)

Ítems	Score
You do not eat breakfast	-1
You have a dairy product for breakfast (milk, yogurt, etc.)	+1
You have a cereal or cereal-derived product for breakfast	+1
You consume industrial pastries for breakfast	-1
You eat a fruit or natural fruit juice every day	+1
You eat a second fruit every day	+1
You consume a second dairy product during the day	+1
You eat fresh or cooked vegetables once a day	+1
You eat fresh or cooked vegetables more than once a day	+1
You consume fish regularly (at least 2–3 times per week)	+1
You go to a fast-food restaurant once or more per week	-1
You consume alcoholic beverages (beer, mixed drinks, wine, etc.) once or more per week	-1
You enjoy consuming legumes (more than once per week)	+1
You consume sweets and candies several times a day	-1
You eat pasta or rice almost daily (≥ 5 times per week)	+1
Olive oil is used at home	+1

Procedure

The Krece Plus nutritional habits questionnaire was provided to study participants several days prior to their scheduled anthropometric assessments. The test was distributed to the coaches of the participating teams so that players could take it home and complete it with the assistance of their parents/guardians, as it was accompanied by the required informed consent for research purposes. This approach ensured a more reliable record of responses, as the questionnaire was completed in the calm environment of the home and with adults available to provide guidance in case of doubts. Participants subsequently attended the anthropometric assessment session with the complete questionnaire which they handed in at that time.

Statistical Analysis

Statistical analyses were conducted using IBM SPSS Statistics Data Editor (SPSS Inc., Chicago, USA) and Microsoft Office Excel 2010 (Microsoft Corp., Redmond, WA, USA), with a significance level set at $p < .05$. Normality tests (Kolmogorov–Smirnov), descriptive analyses (means, standard deviations, ranges, maxima and minima), correlational analyses (Spearman's coefficient), and comparative tests for parametric and nonparametric variables (Kruskal–Wallis H test and Mann–Whitney U test) were performed according to the variables under investigation. Finally, chi-square tests and additional Spearman correlations were conducted.

Results

Table 2 presents the distribution of the sample according to the three levels established to categorize nutritional status. A total of 44% of the football players exhibited a low nutritional level, and more than 91% fell within the low-to-moderate category, while only 8.5% were classified within the high nutritional quality level.

Table 2

Sample scores in the Krece Plus test

		Mean	±	SD	Min	Max	*Range*	*P*
Low N= 43.90%	U13	4.17	±	.75	3	5	2	Ns.
	U15	4.71	±	.49	4	5	1	
	U18	3.74	±	1.82	-2	5	7	
	Total	4.00	±	1.53	-2	5	7	
Mean N= 47.56%	U13	6.89	±	.60	6	8	2	Ns.
	U15	6.50	±	.71	6	8	2	
	U18	6.55	±	.83	6	8	2	
	Total	6.62	±	.75	6	8	2	

		Mean	±	SD	Min	Max	*Range*	*P*
High N= 8.54%	U13	9.50	±	.71	9	10	1	Ns.
	U15	9.67	±	.58	9	10	1	
	U18	9.50	±	.71	9	10	1	
	Total	9.57	±	.54	9	10	1	

*Note. * p < .001.*

Table 3 examines these general results in percentage terms, providing a detailed view of each of the items comprising the Krece Plus test. A total of 99% of the athletes reported having breakfast regularly; however, 19% did not include a dairy product at breakfast (item 2), 28% did not consume cereals or cereal-derived products at breakfast (item 3), and 25% consumed industrial pastries (item 4).

Regarding vegetable intake, athletes generally limited their consumption of fresh or cooked vegetables to only one serving per day, as 84% of respondents denied consuming them more than once daily (item 9). In relation to legume intake, 52% reported consuming them habitually (more than once per week), while 48% did not do so regularly (item 13).

Finally, a progressive increase in the consumption of sweets and candies was observed across categories: 0% in the under-13 (infantil) group, 4% in the under-15 (cadete) group, and 20% in the under-18 (juvenil) group (item 14).

Table 3

Distribution of Krece Plus test items across categories in the sample

	U13		U15		U18		Total	
Item	Yes	No	Yes	No	Yes	No	Yes	No
1	22%	0%	24%	0%	53%	1%	99%	1%
2	17%	5%	23%	1%	41%	13%	81%	19%
3	11%	11%	20%	4%	41%	13%	72%	28%
4	1%	20%	6%	18%	18%	36%	25%	75%
5	17%	5%	17%	7%	29%	25%	63%	37%
6	7%	14%	6%	18%	10%	45%	23%	77%
7	13%	8%	16%	8%	33%	22%	61%	39%
8	7%	14%	16%	8%	28%	27%	51%	49%
9	4%	18%	4%	20%	8%	46%	16%	84%
10	18%	4%	16%	8%	37%	17%	71%	29%
11	2%	19%	7%	17%	24%	30%	34%	66%
12	0%	22%	0%	24%	5%	49%	5%	95%
13	12%	18%	13%	9%	27%	22%	52%	48%

	U13		U15		U18		Total	
14	0%	22%	4%	20%	20%	34%	24%	76%
15	11%	11%	14%	10%	42%	12%	67%	33%
16	22%	0%	24%	0%	54%	0%	100%	0%

When the analysis was approached from the perspective of the players' on-field positions, mean values revealed a marked homogeneity across the different positions. This suggests the absence of statistically significant differences that would support a hypothesis of positional differentiation. It is worth noting, however, that players with the lowest scores were concentrated in the forwards and wingers group (see Table 4). Finally, Pearson correlation analyses were conducted between questionnaire scores and body composition metrics, including weight, height, BMI, fat mass, and muscle mass, confirming the absence of significant associations.

Table 4

Kruskal–Wallis analysis of Krece Plus test scores by playing position

	Mean		SD	Min	Max	P
Goalkeeper	5.88	±	2.10	3	9	Ns.
Lateral defender	6.00	±	1.85	2	10	
Central defender	5.63	±	1.51	3	8	
Midfielder	5.58	±	1.53	3	9	
Forward / Winger	5.63	±	2.84	-2	10	
U13	6.24	±	1.89	3	10	Ns.
U15	6.35	±	1.76	4	10	
U18	5.24	±	2.18	-2	10	

Note. Ns.: not significant. Mean difference significant at the .05 level.

Discussion

In 2010, it was estimated that 42 million children worldwide were overweight, of whom approximately 35 million resided in developing countries (WHO, 2016). In the European context, it has been reported that one in six children is overweight, while one in twenty adolescents is obese (Jannsen et al., 2005). Regarding the nutritional factor, the results of this study show no significant differences among participants based on either playing position or sports category. Data stability was observed across the 11–18-year age range, with no relevant improvements or deterioration. Therefore, it can be inferred that the dietary habits of young football players tend to remain constant throughout the different formative stages (North et al., 2022), i.e., childhood (under-13 category), adolescence (under-15 category), and youth (under-18 category), constituting an individual trait (García-Artero et al., 2007) rather than a characteris-

tic determined by category or playing position. In this regard, Burke and Cox (2010) emphasize that nutrition in young athletes is influenced more by personal and family factors than by the specific sporting context.

Analyzing the responses of developing football players regarding breakfast, 99% of participants reported having breakfast regularly, a higher figure than in previous studies, such as those by Correa-Rodríguez et al. (2013) and Aranceta et al. (2004), which reported 85% and 91%, respectively. However, deficiencies in breakfast quality were noted, as 19% did not include dairy, 28% skipped cereals or cereal-derived products, and 25% consumed industrial pastries. This composition diverges from nutritional recommendations and aligns with findings from the enKid study (Serra-Majem et al., 2003). Similar results were reported by Llargués et al. (2009) in a broader sample of younger schoolchildren, where 23% did not include dairy at breakfast and over 20% consumed industrial pastries. A marked insufficiency in vegetable intake was also identified, as 84% of footballers reported consuming vegetables only once per day, a trend documented in previous studies where percentages exceeded 70% (Correa-Rodríguez et al., 2013; Llargués et al., 2009). Regarding legume consumption, the present study shows lower adherence rates compared with Aranceta et al. (2004) and Correa-Rodríguez et al. (2013), who reported 86% and 83%, respectively. Finally, it is noteworthy that sweets and candy consumption increased with sports category, ranging from 0% in the under-13 group to 20% in the under-18 group, representing 24% of the total sample, similar to the enKid study (27–28%) (Serra-Majem et al., 2003). Moreover, the weekly frequency of fast-food consumption increased notably compared to Llargués et al. (2009), reaching 34%.

Concerning the initial hypothesis, a relationship was expected between body composition variables of formative football players and their nutritional habits (Thomas et al., 2016). This hypothesis was ultimately rejected due to the absence of significant results. This aligns with García-Rovés et al. (2014), emphasizing that adequate nutrition in young athletes is fundamental not only for athletic success but also for growth, development, and overall health (Oliveira et al., 2017).

In 2005, the Spanish Ministry of Health and Consumer Affairs implemented the NAOS Strategy ("Nutrition, Physical Activity, Obesity Prevention, and Health"), an integrated action aimed at raising awareness among sectors of society that can and should play a key role in preventing health issues, including food companies, advertisers, journalists, professional athletes, public figures, and society at large. In this context, the nutritional status of the young football players analyzed in this study is concerning. 44% of the sample was at high nutritional risk, classified in the low-level tier, while 47.6% were in the medium tier. These figures are consistent with Calvo-Pacheco et al. (2014), who reported low nutritional levels in 59%, medium in 31.6%, and high in only 9.2% among 9–10-year-old children. Similarly, Navarro-Pérez et al. (2016) reported 54% low, 39.1% medium, and 6.9% high nutritional status in a sample of 7,000 children and adolescents aged 9–17.9 years, confirming the reliability of the present findings.

Overall, the nutritional risk factor is alarming, with 91% of players at medium-to-high nutritional risk, a trend observed in other studies: Calvo-Pacheco et al. (2014) 89%, Navarro-Pérez et al. (2016) 93%, and De-Rufino et al. (2014) 88% (Cantabrian schoolchildren). Another relevant factor is the mean Krece Plus test score, 5.72 points, slightly higher than in other studies, reflecting that this group of young football players regularly practices the sport. In comparison, González-Jiménez et al. (2013) reported a mean score of 4.05 points among 14–19-year-olds, increasing to 4.68 points after

an educational intervention on dietary habits, in a sample of school adolescents not engaged in regular physical activity.

As limitations, this study could benefit from a larger sample of at least 500 school-aged soccer players participating in extracurricular activities. This would allow for more pronounced or less pronounced differences and more rigorous conclusions. Furthermore, longitudinal studies with several weeks of intervention would be valuable to determine whether changes in nutritional habits are maintained over time. This approach would promote not only regular sports participation but also the development of healthy nutritional habits in collaboration with educational institutions.

Conclusion

The main findings of this study showed that 12- to 18-year-old students attending secondary and high schools exhibited dietary deficiencies, with a notable prevalence of regular consumption of sweets and candies, affecting nearly a quarter of the sample. Consequently, these patterns are concerning given the high proportion of participants at nutritional risk (44%).

As future research directions, it is proposed to develop an intervention program aimed at improving dietary habits, such as promoting fruit and vegetable consumption, ensuring an adequate breakfast, and reducing sedentary activities (e.g., watching television or playing video games). In addition, the program would aim to stimulate physical activity in all its forms, including school-based, extracurricular, sports-specific, and recreational activities.

Conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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