

Previous intakes to a competitive match in young soccer players

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Summary

Introduction: It has been shown that nutrition plays a crucial role in sport performance, consequently athletes should pay attention to their nutritional habits. However, it is not completely clear what athletes eat just before the sport competition.

Objectives: Analyze the previous energy and nutrient ingestions to a match in soccer players.

Material and method: Previous intakes from forty-seven players were collected using a 24 hours recall questionnaire. Twenty-four and three hours intakes before the competition were examined using a nutrient's composition software. Brand names of commercial food were included. Information concerning time of day, cooking methods and amount of food prepared were collected. Height and weight were measured. Players were asked if they have received nutritional directions in previous seasons. Descriptive statistics (mean \pm SD) and t-student analyses were used.

Results: The mean kcal ingestion was 34.68 ± 16.31 kcal/kg body weight twenty-four hours and 6.89 ± 3.38 kcal/kg body weight three hours before. Carbohydrate average intake was 3.35 ± 1.59 grams/kg body weight twenty-four hours and 0.87 ± 0.43 grams/kg body weight three hours before the match. Proteins mean consumption was 1.49 ± 0.76 grams/kg body weight twenty-four hours and 0.23 ± 0.16 grams/kg body weight three hours before the match. Differences were obtained between players who received nutritional direction and the other players in energy, carbohydrate, proteins and lipids ingested.

Conclusion: The players studied presented a low kcal and carbohydrate ingestion twenty-four and three hours before a competitive match and they did not fulfill nutritional recommendation. However, nutritional directions could improve previous energy and nutrients intakes.

Key words:

Soccer. Nutrition. Nutrients. Energy. Carbohydrates.

Ingestas previas a un partido oficial en jugadores de fútbol jóvenes

Resumen

Introducción: Se ha demostrado que la nutrición juega un papel crucial en el rendimiento deportivo, por ello los deportistas deberían de prestar atención a sus hábitos nutricionales. Sin embargo, no está completamente claro qué es lo que toman los deportistas justamente antes de la competición.

Objetivos: Analizar las ingestas previas de energía y nutrientes antes de un partido en jugadores de fútbol.

Materiales y métodos: Se recogieron las ingestas previas de cuarenta y siete jugadores de fútbol usando un cuestionario de 24 horas. Se analizó la ingesta de energía y nutrientes 24 y 3 horas antes del partido utilizando un software de composición nutricional. Se incluyó nombres de marcas comerciales. Se recogió información sobre el horario, los métodos de cocinado y la cantidad de comida preparada. Se midió la altura y el peso de cada jugador. Se les preguntó a los jugadores si habían recibido recomendaciones nutricionales en temporadas anteriores. Se utilizaron métodos estadísticos descriptivos y análisis t-student

Resultados: La ingesta calórica media fue de $34,68 \pm 16,31$ kcal/kg de peso veinticuatro horas antes y $6,89 \pm 3,38$ kcal/kg peso en las tres horas previas. El consumo medio de carbohidratos fue $3,35 \pm 1,59$ gramos/kg en las 24 horas y de $0,87 \pm 0,43$ gramos/kg en las tres horas previas. El consumo de proteínas fue de $1,49 \pm 0,76$ gramos/kg de peso en el día previo y de $0,23 \pm 0,16$ gramos/kg en las tres horas anteriores al partido. Se obtuvieron diferencias entre los jugadores que recibieron recomendaciones nutricionales y los que no en las ingestas de energía, carbohidratos, proteínas y lípidos.

Conclusión: Los jugadores estudiados presentaron una baja ingesta de kcal y carbohidratos en las veinticuatro y en las tres horas anteriores al partido y no cumpliendo con las recomendaciones alimentarias. Sin embargo, recomendaciones nutricionales podrían mejorar la ingesta de energía y nutrientes.

Palabras clave:

Fútbol. Nutrición. Nutrientes. Energía. Carbohidratos.

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Introduction

From long time ago, it is well known that nutrition plays an essential role in sport performance. The pattern of play in soccer is based on intermittent high-intensity actions and soccer particular skills where muscle glycogen and plasma glucose are crucial for energy production¹. A lot of importance is given to previous ingestion to a sport competition. Mujika *et al*² proposed that performance in team sports is often related with nutritional factors, right nutritional directions allow the athletes to be well fueled and hydrated during the games. They recommend that athletes should take 1-4 g of carbohydrate per kg of body weight (BW) 1-4 h before the trials and during the games tasting carbohydrate 30-60 g per hour. A previous study³ focused on the nutrition on match day; the authors highlighted the combination of a high carbohydrate pre-match meal and a sports drink during the match. A pre-match intake should be composed of low-glycaemic index (GI) carbohydrate foods because this option would result in feeling of satiety for longer and a stable blood glucose concentration.

Another research⁴ assessed dietary intake and nutrition knowledge in elite and sub-elite male soccer players. They found that nutrition knowledge was weak and dietary intake did not fulfill with carbohydrate recommendation. Andrews MC, Itsiopoulos⁵ examine three days of dietary intake in male soccer professional and semiprofessional players. Their intakes did not fulfill carbohydrate recommendations, even, some interviewed athletes consumed alcohol. A positive correlation between sport nutrition knowledge and carbohydrate intake was described. They speculated that nutritional education would be really useful to improve dietary practices. Additionally, Azizi *et al*⁶ showed that nutrition knowledge of young athletes needs to be improved. Another paper⁷ determined nutrients intake in Japanese collegiate soccer players. Carbohydrate and protein intakes were lower than recommended targets. The dietary patterns showed a low ingestion of vegetables, milk and dairy products, fruits and eggs.

A previous study⁸ evaluated the nutritional intake of soccer players from the junior teams of a Spanish First Division Soccer League Club. The mean energy intake was 2796.4 ± 525.8 kcal, players analyzed ingested 1.6 ± 0.4g/kg BW of proteins and 4.7 ± 1.1g/kg BW of carbohydrate. Russell and Pennock⁹ examined nutritional habits of professional male soccer players from a youth team of a UK based Championship club. Mean energy ingestion was 2831 kcal. The intake of carbohydrates was 5.9 ± 0.4 g/kg BW/d, proteins ingestion was 1.7 ± 0.1 g/kg BW/d and fat consume was 1.5 ± 0.1 g/kg BW/d. Caccialanza *et al*¹⁰ determined dietary intake of a sample of seventy-five young soccer players. Mean kcal intake was 37.7 kcal/kg BW, mean consumption of carbohydrate was 5.0 g/kg BW, proteins 1.5 g/kg BW and lipids were 87.1 g/kg BW. Few studies have analyzed nutritional intakes on female soccer players or soccer referees, although it has been reported that female soccer player and soccer referees did not completely fulfill nutritional recommendations^{11,12}.

Taking in consideration all these studies, it seems that generally soccer players do not fulfill dietary intakes recommendations, although it is not completely clear yet. But it seems that nutritional knowledge could be a useful instrument to improve these dietary patterns. The mean objective of the current research was to analyze the twenty-four and three hours previous intakes to a competitive match.

Material and method

Subjects

A total of fifty-eight soccer players from an amateur Spanish team voluntary participated. The mean age was 17.43 ± 2.88 years. They were regularly involved in competitive trainings and matches. The study was conducted during the first months of competitive season. They delivered informed written consents which had been signed by their parents.

Dietary assessment section

Previous twenty-four and three hours dietary intake to a competitive soccer match was recorded with a 24 hour recall questionnaire. Highly skill technicians supervised and helped soccer players to complete the questionnaires in order to collect accurate information. Soccer players were provided with written and verbal indications to record foods and fluids ingested with household measures. Brand names of commercial food were included. Information concerning time of day, cooking methods and amount of food prepared were collected. Questionnaires were reviewed to clarify ambiguous data. Eleven questionnaires were removed because these questionnaires did not express clear information for this reason the final sample was constituted by forty-seven soccer players.

The questionnaires were analyzed with a nutrient's composition software program (DIAL 1.19 version) to determine participant's nutrient intake for the 24 hours and 3 hours period studied. This process was performed by a single trained and experienced technician. This method has been previously validated in young soccer players to analyze food intake^{13,14}.

Soccer academy where the study was performed had a nutrition area as part of the medical services. Consequently, some of the athletes examined had received nutritional attention in previous seasons as part of nutrition area previous work. Soccer players were asked about if they have received personalized nutritional attention by nutrition area of the soccer academy in previous seasons in order to examine if a previous intervention could have effects in previous food intakes. This nutritional intervention was defined as an individual consultation including nutritional recommendations. The recommendations highlighted the importance of carbohydrates from fruits, cereals and vegetables before and after competition to improve sport performance. High protein foods such as fishes, meats, nuts, milk and dairy products were recommended after sport practice to promote muscular recovery. Soccer players were discouraged to ingest ultra-processed products due to its high level in simple sugars. Weight (kg) and height (cm) were recorded using an electronic weighing machine (Tanita UM-0.76) and stadiometer (Seca).

The experimental protocol was written following the ethics rules from Helsinki Declaration. All experimental procedures were in accordance with the Pablo de Olavide University Ethical Committee rules.

Statistical Analysis

SigmaPlot 12.5 version (Systat software) was used for Statistical Analyses. Descriptive statics (mean ± SD) were reported for the different parameters analyzed. T-student analyses were used in order to determine significant differences. The effect sizes (ES) were conducted according to previous procedures^{15,16} using values for Cohen's (<0.2 small

effect; <0.5 medium effect; <0.8 large effect). Quantitative differences were assessed qualitative (QA) as a previous reference¹⁷ <1% almost certainly not; 1-5% very unlikely; 5-25% unlikely; 25-75% possible; 75-95% probably; 95-99% very likely and >99% almost certain. The level of significance was set at $p < 0.05$ and all data are reported as means and 95% confidence intervals (CI).

Results

The mean weight and height were 67.77 ± 8.33 kg and 172.92 ± 6.57 cm. Mean intakes of energy (kcal), proteins, carbohydrates and lipids are presented in Table 1. Mean energy ingestion was 2277.55 kcal 24 hours before the match and 457.33 kcal 3 hours before. Carbohydrates consumption was 220.59 grams 24 hours before and 58.04 grams 3 hours before the match. Mean protein ingestion was 97.50 grams 24 hours and 15.83 grams 3 hours before. Lipids consumption was 109.94 grams 24 hours before the match and 19.27 grams 3 hours before.

Figure 1 shows the ingestions of energy and nutrients analyzed 24 and 3 hours before the match. Figure 1 also distinguishes between players who received nutritional recommendations in previous seasons and players who did not received. Soccer players with nutritional recommendations consumed 43.17 ± 14.99 kcal/kg BW, 4.08 ± 1.61 g of carbohydrates/kg BW, 1.91 ± 0.67 g of proteins/kg BW and 2.03 ± 0.80 g of lipids/kg BW 24 hours before the match. While players with no recommendations consumed 30.29 ± 15.40 kcal/kg BW, 2.96 ± 1.46 g of carbohydrates/kg BW, 1.27 ± 0.72 g of proteins/kg BW and 1.47 ± 0.82 g of lipids/kg BW 24 hours before the match.

Soccer player who received nutritional recommendations took 8.60 ± 1.65 kcal/kg BW, 1.09 ± 0.30 g of carbohydrate/kg BW, 0.26 ± 0.08 g of proteins/kg BW and 0.33 ± 0.09 g of lipids/kg BW 3 hours before the match. While players who did not received these recommendations consumed 6.00 ± 3.64 kcal/kg BW, 0.76 ± 0.45 g of carbohydrates/kg BW, 0.22 ± 0.19 g of proteins/kg BW and 0.26 ± 0.20 g of lipids/kg BW 3 hours before the match.

Discussion

The main point of this study was to examine the previous intakes before a match in youth soccer players, the average kcal/kg BW consumption was 34.68 ± 16.31 24 hours before a match, the average protein g/kg BW ingestion was 1.49 ± 0.76 and the mean carbohydrates consumption g/kg BW was 3.35 ± 1.59 . Three hours before the match, soccer players consumed 6.89 ± 3.38 kcal/kg BW and 0.87 ± 0.43 carbohydrate g/kg BW.

Differences were found in energy, proteins and carbohydrates consumption 24 hours and 3 hours in soccer players when they have attended to nutritional consultancies.

Few studies have examined nutritional intakes in soccer players, a recent paper¹⁸ evaluated seventy-two young male soccer players from junior teams in Mexican National Soccer league. The authors observed an energy intake of 2500-3100 kcal and a carbohydrate intake 5.4-6.7 g/kg BW/day, showing an optimal carbohydrates energy contribution. Furthermore, these players presented a 1.2 ± 0.1 g/kg BW carbohydrate pre-exercise ingestion. Another research¹⁹ examined eighty-one soccer players from the Arenas Football Club (Bizkaia, Spain). They found a mean consumption of 41.14-54.61 kcal/kg BW, 1.81-2.14 g/kg BW proteins, 1.76-2.20 g/kg BW lipids and 4.57-6.68 g/kg BW carbohydrates. Even, another study²⁰ evaluated nutrient intake in sixteen England female soccer players. They observed a low energy intake 1904 ± 366.3 kcal, 4.1 ± 1.0 g/kg BW carbohydrate, 1.2 ± 0.3 proteins g/kg BW and 0.9 ± 0.2 fats g/kg BW. Clark *et al*²¹ examined fourteen female soccer players. At the beginning of the season, players presented a 2290 ± 310 kcal intake, 5.2 ± 1.1 carbohydrate g/kg BW ingestion and 1.4 ± 0.3 protein g/kg BW consumption.

These studies show that soccer players need enough energy consumption and carbohydrate to maintain energy supplies for sport demands²². In our study, the carbohydrate ingestion was greater than the rest of macronutrients in line with the results from previous studies probably due to the impact of carbohydrate ingestion on intermittent sports performance like soccer¹. However, a lower carbohydrate consumption was detected. As it has been previously mentioned²³ this situation could have negative consequences on sport performance; athletes examined should be encouraged to increase carbohydrates in their diets in order to enhance their muscle glycogen stores before the match. Soccer players analyzed presented a low ingestion of kcal and carbohydrate while they showed an acceptable proteins and lipids consumption. García-Rovés *et al*²⁴ highlighted that is essential analyzed nutritional ingestions and food preferences to implement successfully a nutritional program in soccer players and they reported that few studies of nutritional ingestion in soccer players are available. Consequently, it could be important to analyze nutrients and energy intake before a nutritional intervention in soccer.

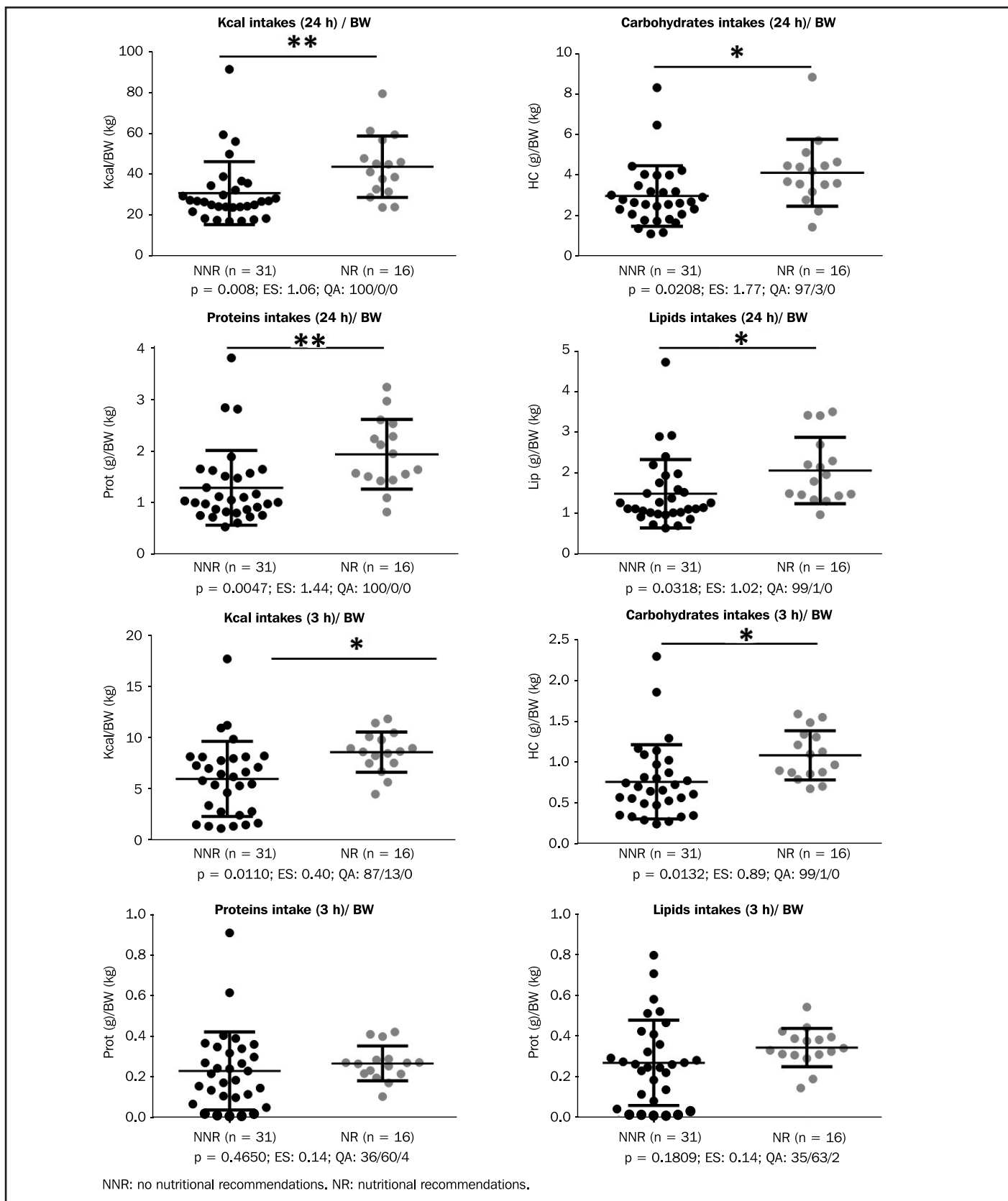
It seems that nutritional interventions could improve previous nutrient ingestions to a competitive match in young players. As it can be seen in Figure 1, nutritional interventions increased total kcal, proteins, carbohydrates and lipids ingestion 24 and 3 hours before the sport competition. However, carbohydrates ingestion per day from players who received nutritional recommendations and who did not receive

Table 1. Energy and nutrient ingestion in the young soccer players studied.

	Intakes (24 hours)	Intakes (3 hours)	Intakes (24 hours) / BW (kg)	Intakes (3 hours) / BW (kg)
Energy (kcal)	2277.55 ± 902.66	457.32 ± 204.74	34.68 ± 16.31	6.89 ± 3.38
Carbohydrates (grams)	220.59 ± 91.44	58.04 ± 26.25	3.35 ± 1.59	0.87 ± 0.43
Proteins (grams)	97.50 ± 42.36	15.83 ± 10.02	1.49 ± 0.76	0.23 ± 0.16
Lipids (grams)	109.94 ± 49.38	19.27 ± 12.10	1.66 ± 0.85	0.28 ± 0.18

Data frequencies for 47 soccer players. BW (body weight).

Figure 1. Energy and nutrients intakes normalized with body weight.



it were away from recommended intakes (4.08 ± 1.61 and 2.96 ± 1.46 vs $6-10$ g/kg BW)². Besides, players who received nutritional guidance fulfilled fuel requirements for match play 3 hours before the game while players did not receive did not fulfilled (1.09 ± 0.30 and 0.76 ± 0.45 vs $1-4$ g/kg BW)². Molina-López *et al.*²⁵ supported these results because they proposed that nutritional education programs could lead athletes to adopt appropriate nutritional habits. Another study²⁶ examined dietary ingestions in professional soccer players obtaining that macro and micro nutrients consumption was inadequate, therefore nutritional intervention could be helpful.

Additionally, a positive correlation between nutrition knowledge and carbohydrate intake was previously obtained⁵ and the authors proposed that nutritional education would improve dietary habits in soccer players. Another study²⁷ suggested that previous nutritional interventions have increased carbohydrate content in soccer player's diets, improving sport performance, as we have obtained in the present study. Additionally, Murphy and Jeanes²⁸ proposed that there would be a needed assistance in young soccer players to implement nutritional knowledge to increase nutritional intakes indicating that nutritional guidance would be really beneficial for athletes.

The present research is one of the first studies that analyze energy and nutrient ingestions before a match in Spanish young soccer players.

The current study presents limitations. Firstly, there are errors inherent of all dietary recall methods. Furthermore, we have only studied young male nonprofessional soccer players, consequently conclusions obtained cannot be extrapolate neither the rest of soccer players nor other sport disciplines. Another would be the selection no probabilistic of the players evaluated.

Finally, the players studied presented a low kcal and carbohydrate ingestion 24 and 3 hours before a competitive match. However, a nutritional intervention could improve previous energy and nutrients intakes.

Conflict of interest

The authors do not declare a conflict of interest.

Bibliography

- Baker LB, Rollo I, Stein KW, Jeukendrup AE. Acute Effects of Carbohydrate Supplementation on Intermittent Sports Performance. *Nutrients*. 2015;7:5733-63.
- Mujika I, Burke LM. Nutrition in Team Sports. *Ann Nutr Metab*. 2010;57:26-35.
- Williams C, Serratos L. Nutrition on match day. *J Sports Sci*. 2006;24:687-97.
- Devlin BL, Leveritt MD, Kingsley M, Belski R. Dietary Intake, Body Composition and Nutrition Knowledge of Australian Football and Soccer Players: Implications for Sports Nutrition Professionals in Practice. *Int J Sport Nutr Exerc Metab*. 2016; 6:1-21.
- Andrews MC, Itsiopoulos C. Room for Improvement in Nutrition Knowledge and Dietary Intake of Male Football (Soccer) Players in Australia. *Int J Sport Nutr Exerc Metab*. 2016;26:55-64.
- Azizi M, Rahmani-Nia F, Malaee M, Malaee M, Khosravi N. A study of nutritional knowledge and attitudes of elite college athletes in Iran. *Braz J Biometrics*. 2010;4:105-12.
- Noda Y, Iide K, Masuda R, Kishida R, Nagata A, Hirakawa F, *et al*. Nutrient intake and blood iron status of male collegiate soccer players. *Asia Pac J Clin Nutr*. 2009;18:344-50.
- Iglesias-Gutiérrez E, García A, García-Zapico P, Pérez-Landaluce J, Patterson AM, García-Rovés PM. Is there a relationship between the playing position of soccer players and their food and macronutrient intake? *Appl Physiol Nutr Metab*. 2012;37:225-32.
- Russell M, Pennock A. Dietary Analysis of Young Professional Soccer Players for 1 Week During the Competitive Season. *J Strength Cond Res*. 2011;25:1816-23.
- Caccialanza R, Cameletti B, Cavallaro G. Nutritional Intake of Young Italian High-Level Soccer Players: Under-Reporting is the Essential Outcome. *J Sports Sci Med*. 2007;6:538-42.
- Clark M, Reed DB, Crouse SF, Armstrong RB. Pre- and post-season dietary intake, body composition, and performance indices of NCAA division I female soccer players. *Int J Sport Nutr Exerc Metab*. 2003 09;13:303-19.
- Martínez Reñón C, Collado PS. An assessment of the nutritional intake of soccer referees. *J Int Soc Sports Nutr*. 2015;12:8.
- Briggs MA, Rumbold PLS, Cockburn E, Russell M, Stevenson EJ. Agreement between Two Methods of Dietary Data Collection in Male Adolescent Academy-Level Soccer Players. *Nutrients*. 2015;7:5948-60.
- Sunami A, Sasaki K, Suzuki Y, Oguma N, Ishihara J, Nakai A, *et al*. Validity of a Semi-Quantitative Food Frequency Questionnaire for Collegiate Athletes. *J Epidemiol*. 2016;26:284-91.
- Cohen J. *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ.: L. Erlbaum Associates; 1988.
- Hopkins WG. Spreadsheets for analysis of controlled trials with adjustment for a subject characteristic. *Sports Science*. 2006;10:46-50.
- Hopkins WG, Marshall SW, Batterham AM, Hanin J. Progressive statistics for studies in sports medicine and exercise science. *Med Sci Sports Exerc*. 2009;41(1):3-13.
- Hidalgo y Teran Elizondo R, Martín Bermudo FM, Peñaloza Mendez R, Berná Amorós G, Lara Padilla E, Berral de la Rosa FJ. Nutritional intake and nutritional status in elite Mexican teenagers soccer players of different ages. *Nutr Hosp*. 2015;4:1735-43.
- Ruiz F, Irazusta A, Gil S, Irazusta J, Casis L, Gil J. Nutritional intake in soccer players of different ages. *J Sports Sci*. 2005;23:235-42.
- Martin L, Lambeth A, Scott D. Nutritional practices of national female soccer players: analysis and recommendations *J Sports Sci Med*. 2006;5:130-7.
- Clark M, Reed DB, Crouse SF, Armstrong RB. Pre- and post-season dietary intake, body composition, and performance indices of NCAA division I female soccer players. *Int J Sport Nutr Exerc Metab*. 2003;13:303-19.
- Logue D, Madigan SM, Delahunt E, Heinen M, Mc Donnell SJ, Corish C. Low Energy Availability in Athletes: A Review of Prevalence, Dietary Patterns, Physiological Health, and Sports Performance. *Sports Med*. 2018;48:73-96.
- Saltin B. Metabolic fundamentals in exercise. *Med Sci Sports*. 1973;5:137-46.
- García-Rovés PM, García-Zapico P, Patterson AM, Iglesias-Gutiérrez E. Nutrient intake and food habits of soccer players: analyzing the correlates of eating practice. *Nutrients* 2014;6:2697-717.
- Molina-López J, Molina JM, Chiroso LJ, Florea D, Sáez L, Jiménez J, *et al*. Implementation of a nutrition education program in a handball team; consequences on nutritional status. *Nutr Hosp*. 2013;28:1065-76.
- Raizel R, da Mata Godois A, Coqueiro AY, Voltarelli FA, Fett CA, Tirapegui J, *et al*. Pre-season dietary intake of professional soccer players. *Nutr Health*. 2017;23:215-22.
- Briggs MA, Rumbold PLS, Cockburn E, Russell M, Stevenson EJ. Agreement between Two Methods of Dietary Data Collection in Male Adolescent Academy-Level Soccer Players. *Nutrients*. 2015;7:5948-60.
- Murphy S, Jeanes Y. Nutritional knowledge and dietary intakes of young professional football players. *Nutrition & Food Science*. 2006;36:343-8.