



Analysis Of Carbohydrates Role In The Performance Of Soccer Athletes: Systematic Literature Review

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Keywords

Carbohydrate;
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Abstract

The purpose of this study was to analyze the role of carbohydrates in the performance of soccer athletes. A Systematic Literature Review (SLR) was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The literature search, conducted across databases using specific keywords, identified 152 articles published between 2020 and 2024. After applying the inclusion and exclusion criteria, 42 relevant articles were selected, while 110 were excluded due to inaccessibility or irrelevance. Further screening based on keywords related to soccer, carbohydrates, and performance resulted in 27 articles, of which 10 were considered the most relevant for analysis. The study concluded that proper nutrition, especially carbohydrate intake, plays a vital role in maintaining energy levels, improving endurance, and supporting overall physical and cognitive performance. Carbohydrates contribute to better metabolism, delay fatigue, and support mental functions that are essential for decision-making during matches. This study emphasizes the importance of adhering to science-based nutritional guidelines and consulting with an experienced sports nutritionist to help athletes optimize performance and maintain health during training and competition.

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INTRODUCTION

Football play can be affected the type amount and timing of food, fluids and supplements players consume, as well as their level of performance and recovery during and after the game (Collins et al., 2020). Factors such as exercise intensity, duration, training status, and substrate availability influence muscle glycogenolysis and carbohydrate oxidation (CHO) rates. Endurance athletes are generally advised to ensure high CHO availability before, during, and after high-intensity exercise sessions or competition, given the effect of high CHO availability in enhancing exercise performance (Hearris et al., 2018). 36 hours before a match to ensure supercompensation of muscle glycogen. where suscompensation is the condition of the body after physical exercise or the body's adaptation process that occurs when the body is able to do more in response to the pressure caused by exercise (Fernandes, 2020).

For an athlete who does not have any specific health issues, proper carbohydrate consumption greatly impacts their overall health and quality of life. How an athlete performs on the field is greatly influenced by the food (carbohydrate) intake they consume.(Zhong, 2024). Carbohydrate-electrolyte use improve the performance of soccer players, but the effects vary depending on the time of carbohydrate-electrolyte intake (Noh et al., 2023). Carbohydrate consumption before and during competition improves sprint speed, number of sprints, shooting accuracy and speed, time to exhaustion, and cognitive function(Pueyo et al., 2024).

The comes about of (Agustina et al., 2024) This study showed that although there is a positive correlation between carbohydrate intake and VO2 Max, there is limited variation in individual responses to carbohydrate intake, which may affect the final results. In addition, (Wijaya et al., 2021) a limitation in this study is that adolescent soccer athletes may consume insufficient carbohydrates due to lack of nutritional knowledge, which negatively impacts their performance performance. The next limitation (Wijaya et al., 2024) is the negative correlation between fatigue levels and energy adequacy (including carbohydrates), which shows how important it is to consume the right foods to avoid fatigue that can interfere with performance. This study focused on the role of carbohydrates in the performance of soccer athletes. Several limitations were identified, including individual response variability, sample limitations, measurement methodology, environmental and psychological factors, study duration, and the type of carbohydrates assessed. Other associated limitations include increased energy demand during intense matches, the impact of travel and jet lag on metabolic efficiency, dehydration and imbalances affecting endurance, and inadequate post-match recovery strategies.

Organization of the study

Systematic Review was the type of research used, and a comprehensive search strategy was used on the SCOPUS research journal database. Keywords used include "football", "carbohydrates", and "performance".

METHODS

This study discusses the methods used to select articles on " The Role of Carbohydrates in the Performance of Football Athletes " in the preparation of this Systematic Literature Review (SLR). (Rumini et al., 2024)The term "SLR Research" refers to a collection of research on data collection techniques or research subjects that involve using various library sources (books, encyclopedias, scientific journals, magazines, and documents). The preparation of this SLR was carried out in accordance with the Preferred Reporting Items for Systematic Review and Meta Analysis (PRISMA) guidelines (Ridho & Dasari, 2023).

Study participants

Researchers searched for articles from 2020 to 2024, using the keywords "football", "carbohydrate" and "performance" published from the Scopus Collection database (Science Citation Index Expanded; Social Science Citation Index; Arts & Humanities Science Citation Index) To enable reproducibility, the PRISMA 2020 and PRISMA-S guidelines help review teams report their reviews clearly, transparently, and with sufficient detail (Page et al., 2021).

Study organization

The annual trend of articles published between 2020 to 2024, distribution of publications across the first author's institution, number of authors, type of research (experimental, descriptive, correlational, or others), subject (training, health, management, education, or mixed), and average number of

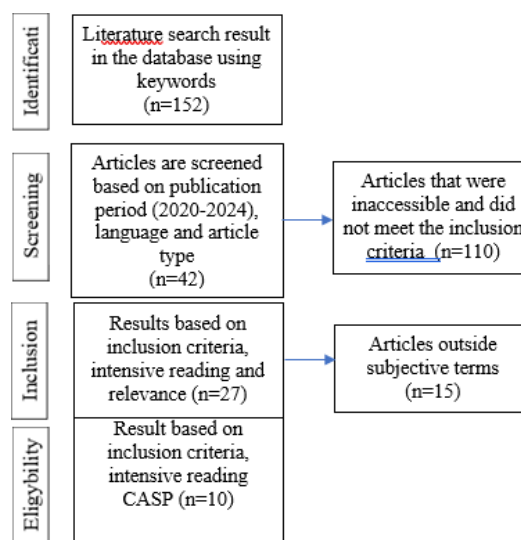
citations per article were factors considered in this literature review.

Statistical analysis

Since the title, abstract, and keywords of the article are strong enough to be used and studied further, the focus is on these. This review study only looks at the general literature that is accessible. The authors took this step because they want their research to be accessible to everyone. Only relevant people who can speak on a particular issue selected based on the exclusion and inclusion criteria listed below will be able to access this research.

RESULT

The results of the literature search in the database were identified by keywords (n=152). From 2020 to 2024, categorical articles (n=42) and inaccessible articles that did not meet the inclusion criteria (110) were selected from the entire database. Furthermore, screened articles were selected based on keywords related to the themes of football, carbohydrate, and performance (n=27), and then relevant articles (n=10) were selected. The PRISMA criteria guided this systematic review, which was conducted using the Scopus primary database. Selected reporting items for systematic reviews



The following table shows the year of publication and the number of publications published during the selected time period.

Table 1. Evolution of the number of publication per year.

Year of Publication	Number of Articles	Percentage
2020	4	14,81%
2021	8	29,63%
2022	5	18,52%
2023	7	25,93%
2024	3	11,11%
Total	27	100%

The number publications has changed over differend time period, as shown in Table 1. Starting with the fact that scientific output in 2020 (4 articles), 2021 (8 articles), 2022 (5 articles), 2023 (7 articles), and 2024 (3 articles) showed increases and decreases.

The following table shows the analysis that can be used to determine the role of nutrition based on the literature:

Title	Objek	Keyword
Dietary Intake, Body compotion and Performance of Profesional Football Athletes in Slovenia	Athlete	Improving Nutrition For Soccer Athletes

(Macuh et al., 2023)		
Portuguese Football Federation consensus statement 2020. Nutrition and Performance in Football (Abreu et al., 2021)	Athlete	Football Nutrition Recommendations
Nutrition Optimization for Female elite football Players— Topical Review (de Sousa et al., 2022)	Athlete	Football Nutrition Recommendations
The Effects Of Pre-Game Carbohydrate Intake On Running Performance And Substrate Utilisation During Simulated Gaelic Football Match Play (O'brien et al., 2021)	Athlete	Carbohydrate Improve The Performa of Soccer Athletes
A Qualitative Investigation of Factors Influencing the Dietary Intakes of Professional Australian Football Players (Jenner et al., 2021)	Athlete	Football Nutrition Recommendations
Energy expenditure, dietary intake and energy availability	Athlete	Football Nutrition Recommendations

in female professional football player (de Sousa et al., 2022a)		Comparison of Australian Football League Women's athletes match day energy and nutrient intake to recommendations (Otte et al., 2024)	Athlete Football Nutrition Recommendations
Improved physical performance of elite soccer players based on GPS results after 4 days of carbohydrate loading followed by 3 days of low carbohydrate diet (Kazemi et al., 2023)	athlete	Carbohydrate Improve The Performa of Soccer Athletes	
Assessment of The Dietary Intake of High-rank Profesional Male Football Players During a Preseason Training week (Książek et al., 2020)	Athlete	Football Nutrition Recommendations	
The Cardiorespiratory Endurance (VO2max), Body Composition and Macronutrient's Intake in the Pre-competitive Period A Correlation Study among Moroccan Professional Soccer Players (Oukheda et al., 2024)	Athlete	Carbohydrate Improve The Performa of Soccer Athletes	<p>DISCUSSION</p> <p>Football is a high-intensity sport played regularly and consisting of several important matches completed at high or maximal intensity, combined with low-intensity activities and rest. A proper nutritional strategy is essential to balance and resist fatigue due to the duration of the competition and the varying energy requirements (Hulton et al., 2022). The food consumed by an athlete must contain the nutrients needed for daily activities and training. The metabolism of food consumed daily provides the energy needed to improve athlete performance (Sasmarianto et al., 2020). To maintain the overall health of the players throughout the season and optimize the athlete's performance during training and matches with proper nutrition (Collins et al., 2020). so that nutrition is very important for an athlete's life, and affects the overall performance and well-being of athletes.. (Amawi et al., 2024)</p> <p>While it cannot be denied that nutrition play an important role in improving the health and abilities of football players, the nutritional methods used by professional football players can very greatly depending on culture, habits and practical issues, and may not always be supported by scientific data (Abreu et al., 2021). Games with short recovery times played during a long competitive season show that a proper nutritional</p>

strategy is required to meet the high physical demands. To maximize sports performance and stay healthy, energy intake must be optimal (de Sousa et al., 2022a). Players are advised to consume 6–8 g/kg of carbohydrate per day the day before, eat 1–3 g/kg 3–4 hours before, and 30–60 g/h of carbohydrate during the match. For the first four hours, starting from the first twenty minutes, 1–1.5 g/kg/h is recommended, as muscle glycogen drops sharply at the end of the match and remains low for 48 hours. Therefore, the suggested guidelines should be followed, adjusted and distributed according to each athlete's energy needs (Pueyo et al., 2024). To achieve proper nutritional intake and support fitness levels, those who are malnourished are advised to adjust their diet and physical activity levels (Priyono et al., 2023). Sports supplement recommendations should be tailored to each individual, and it is important to consult an experienced nutritionist, as they are the ones who can provide the right advice on how to use nutritional supplements to maximize their benefits (Temimilpa Sánchez et al., 2021).

Research results (Yudha Kusuma et al., 2024) factors such as training are not the only ones that affect how well an athlete plays. An athlete's psychology is one that affects performance, and nutrition as their support system, also greatly affects performance when competing. In Research (Gruska et al., 2024) primarily used carbohydrates, beet juice, and sodium citrate. Carbohydrate is the most common acute supplement. Carbohydrate supplements show strong evidence of improving endurance performance, especially during prolonged activity. Carbohydrates also increase blood glucose and improve endurance capacity

during competition. Carbohydrates help soccer athletes play better because they serve as the primary energy source during high-intensity activities. Research shows that Carbohydrates improve running performance and metabolic efficiency, reducing fatigue, when compared to the usual diet of football players (Kazemi et al., 2023). Carbohydrates also help maintain blood glucose levels, which is important for decision making during the game, which is critical for cognitive function and execution skills. (Rollo & Williams, 2023)

CONCLUSIONS

This systematic review highlights the important role of carbohydrates in optimizing soccer performance. As a sport that demands excellent physical and mental abilities, proper nutrition is essential to sustain energy, improve endurance, and maintain overall health during training and competitive matches. carbohydrates as their energy source, which boosts the body's metabolism, reduces fatigue, and aids athletes' cognitive abilities, which are crucial for making decisions during matches. consultation with an experienced nutritionist and following scientifically supported guidelines can help athletes maintain their well-being and peak performance. It is clear that a customized nutrition strategy with a focus on adequate carbohydrate

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