

# For Elite Soccer Players the Carbohydrates Periodization Strategies Should Obey Different Training Load

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## ABSTRACT

For elite soccer players, the information about how much carbohydrate to consume for matches and how much carbohydrate to consume for training is still unclear. By the way, the athletes have different energy demands between matches and training varying if athlete is playing or training, if match is friendly, qualifying or competitive and whether the training is technical, tactical or training match. Therefore, it is important that the carbohydrates prescriptions meet athlete's energy demands ranging from 5 until 10 g. kg<sup>-1</sup> body weight (BW). day<sup>-1</sup>. But, besides that, one week before match, can be use a "modified" consumption in the carbohydrate load applying some periodization strategy that will be commented in this review what can be incorporated during soccer season depending on the sporting events in the week, types of training and types of games.

## Highlights

- Elite soccer players can periodize their carbohydrate intake according to season intensities.
- The carbohydrates offered amount in diet should be in accordance with the intensity of events, whether games or matches.
- As the workouts have different intensities, this should serve as basis for adequate carbohydrate consumption, following the applied carbohydrate periodization strategy.

**Keywords:** carbohydrates periodization, soccer, training and matches

## INTRODUCTION

Soccer is one of the most popular sports in the world, practiced by more than 240 million individuals [1]. On this sport, work carried out by professional soccer athletes during matches involves actions such sprints, maneuvers, changes of direction, jumps, accelerations and decelerations [2]. Besides that, an investigation position specific involving English Premier League athletes demonstrated that evolving tactics can impact on the soccer players physical demands [3]. Therefore, there may be changes in athlete's energy needs when it comes to power in games or training which has impact on

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energy and nutritional demands. The Information about how much carbohydrate to consume for matches and how much carbohydrate to consume for training is still unclear, which can harm the elite soccer players, especially when athletes don't know or don't follow any nutritional monitoring protocol [4]. Thus, this can be one of main reasons why soccer athletes have a low energy intake what compromising performance during matches [5]. Well, athletes can even consume calories adequate but, have an inadequate intake in macronutrients composition, mainly carbohydrates, suggesting need to improve nutritional practices to sustain the physical demands of soccer as it has been recently demonstrated [6]. Thus, this review brings an understanding of the carbohydrate intake that elite soccer players need for different events in season, training and matches. In addition, a proposal for carbohydrate intake according to the periodization of loads applied at different training and matches types.

## METHODS

The search was completed without being confined to any specific years, including results up to 30th March 2020 inclusive. Without obeying pre-established inclusion or exclusion criteria, compilation of studies was evaluated just by the author. Out Of the 89 articles that was identified in search literature, only 19 fulfilled the purpose and provided the reader a summary direct of review clearly and objective.

## RESULTS

What can do to prove this difference appears to be related matches intensity, but not only due to the applied speed also due to the power needs that athlete to impose on field. Because during matches, elite soccer players have a 26 percent increase in total distance covered at high power compared to training corresponding to forty two percent increases in total energy expenditure [7] contextualizing real metabolic power with the caloric need periodized according to games or training. Besides that, it was proven running with ball almost ten percent more energy-demanding than run without ball [8].

Knowing that, a study with six English Premier League players assessing their energy consumption and expenditure for five training days and two match days, resulting in total an energy intake higher in match days ( $3789 \pm 532$  kcal;  $61.1 \pm 11.4$  kcal.  $\text{kg}^{-1}$  fat-free mass) when compared with training days ( $2956 \pm 374$  kcal;  $45.2 \pm 9.3$  kcal.  $\text{kg}^{-1}$  of fat-free mass) [9]. Another

proof that these athletes tend to consume different calories for different situations in the season also came through a observational study assessed the energy expenditure and dietary intake over a fourteen days in forty-one professionals soccer players playing in the Dutch Premier League and checked carbohydrate intake was higher during match days ( $5.1 \pm 1.7$  g.  $\text{kg}^{-1}$  body mass) compared with training ( $3.9 \pm 1.5$  g.  $\text{kg}^{-1}$  body mass) and rest days ( $3.7 \pm 1.4$  g.  $\text{kg}^{-1}$  body mass) [10]. Therefore, elite soccer athletes have different energy demands between matches and training.

Speaking of training, energy differences also can be found among the training types. As evidenced by a study that evaluated ten male elite soccer players and could verify that athletes remained a higher time percentage in the low-intensity zone in technical training compared to tactical training, training match and friendly match, and their absolute heart rate was higher in friendly match compared to training match, tactical training and technical training [11]. Therefore, the intensities applied by elite soccer players tend vary if athlete is playing or training, if match is friendly, qualifying or competitive and whether the training is technical, tactical or training match, and these variations obey not only training type, but at the same whether it is game or training or rest. Being necessary to use dietary prescription models that obey training models and different match types during season to be able to meet required energy and offer the fuel for the required work. And besides that, having dialogue between coaches and nutritionists or between coaches and players to prepare them according to week's planning of games and training models.

## DISCUSSION

Soccer players must change their caloric intake according to the matches and training. Due to the energetic needs these periods and how the ergogenic properties of carbohydrates can play improvement for skill performance and exogenous energy provision [12] becomes important prescribe diets with food amounts meet the athlete's energy demands, because a higher consume calorie can improve dribbling speed and can be ergogenic to improve performance on field [13,14]. Therefore, it is important these prescriptions meet athlete's energy demands and are based on carbohydrate recommendations that range from 5 until 10 g.  $\text{kg}^{-1}$  body weight (BW). day<sup>-1</sup> [15] because when examining twenty two soccer players in relation to effects of a bespoke diet with regulated carbohydrate intake during 4 days, a study found

there was an additional around 888 meters traveled distance on the field during a match [16]. That is, prescriptions that obey required amounts of energy and energy demands of the training types and match types are necessary for elite soccer players to improve performance on the field. But, besides that, to increase the muscle glycogen stores on the week before competition, in this case, week before match, can be use a “modified” consumption in the carbohydrate load applying consumption 8 to 12 g per kg each day for past three days, in addition 24 hours rest prior to competition [17].

Therefore, apply carbohydrates periodization strategies based on training weeks and matches on the season as recently demonstrated [18] is very important to make prescriptions more flexible based on required need for each work. And a

strategy that has been applied for endurance athletes in training week models that precede the competition is known as “sleep low” and consists of training in late afternoon with high carbohydrates availability but depleting all muscle glycogen using only proteins after exercise, followed by low intensity training in next morning in low carbohydrates availability after overnight fast and consuming the diet carbohydrates amount in rest of the day [19]. In summary, in the case of elite soccer players, this strategy can be incorporated after training matches, competitive matches, qualifying matches or friendly matches, when the next day there is a tactical or technical training. The table 1 shows an example of a week of the season with training and matches with the corresponding carbohydrates supply depending on applied event type based on the “Sleep Low” model.

**Table 1:** A recommendation model of carbohydrates periodization for a week for elite soccer players obeying “Sleep Low” model.

	<b>Monday</b> (5 g CHO. kg <sup>-1</sup> BW)	<b>Tuesday</b> (7 g CHO. kg <sup>-1</sup> BW)	<b>Wednesday</b> (7 g CHO. kg <sup>-1</sup> BW)	<b>Thursday</b> (5 g CHO. kg <sup>-1</sup> BW)	<b>Friday</b> (5 g CHO. kg <sup>-1</sup> BW)	<b>Saturday</b> (10 g CHO. kg <sup>-1</sup> BW)	<b>Sunday</b> (10 g CHO. kg <sup>-1</sup> BW)
<b>Breakfast</b>	0.5 g CHO. kg <sup>-1</sup> BW	1.5 g CHO. kg <sup>-1</sup> BW	1.5 g CHO. kg <sup>-1</sup> BW	1.5 g CHO. kg <sup>-1</sup> BW Pós- technical training	1.5 g CHO. kg <sup>-1</sup> BW	2 g CHO. kg <sup>-1</sup> BW Pós-tactical training	2 g CHO. kg <sup>-1</sup> BW
<b>Lunch</b>	1.5 g CHO. kg <sup>-1</sup> BW	1.5 g CHO. kg <sup>-1</sup> BW Pós- training match	1.5 g CHO. kg <sup>-1</sup> BW	0.5 g CHO. kg <sup>-1</sup> BW	1.5 g CHO. kg <sup>-1</sup> BW	2 g CHO. kg <sup>-1</sup> BW	2 g CHO. kg <sup>-1</sup> BW
<b>Snack</b>	0.5 g CHO. kg <sup>-1</sup> BW 1.5 g CHO. kg <sup>-1</sup> BW	1 g CHO. kg <sup>-1</sup> BW	2 g CHO. kg <sup>-1</sup> BW 2 g CHO. kg <sup>-1</sup> BW	0.5 g CHO. kg <sup>-1</sup> BW	0.5 g CHO. kg <sup>-1</sup> BW 1.5 g CHO. kg <sup>-1</sup> BW	2 g CHO. kg <sup>-1</sup> BW	2 g CHO. kg <sup>-1</sup> BW
<b>Dinner</b>	Pós- technical training	2 g CHO. kg <sup>-1</sup> BW	Pós-qualifying match	1.5 g CHO. kg <sup>-1</sup> BW	Pós-training match	2 g CHO. kg <sup>-1</sup> BW	2 g CHO. kg <sup>-1</sup> BW Pós- competitive match
<b>Supper</b>	1 g CHO. kg <sup>-1</sup> BW	1 g CHO. kg <sup>-1</sup> BW	No carbohydrates consumption	1 g CHO. kg <sup>-1</sup> BW	No carbohydrates consumption	2 g CHO. kg <sup>-1</sup> BW	2 g CHO. kg <sup>-1</sup> BW

**Abbreviations:** CHO; carbohydrates, BW; body weight.

## CONCLUSION

Elite soccer players should periodize caloric and carbohydrates intake when matches or training and mainly periodize carbohydrates intake for the different match types and the different training types of due variations in intensities oh the season.

## DECLARATION OF INTEREST STATEMENT

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