Serbian Journal of Sports Sciences
2009, 3(1-4): 19-27, www.sjss-sportsacademy.edu.rs
UDC 613.2:796.332.071.2(495) ISSN 1820-6301
ID 156511500

Scientific Paper
Received: 21 Nov 2008
Accepted: 23 Feb 2009

NUTRITIONAL INTAKE OF SEMI-PROFESSIONAL SOCCER PLAYERS DURING A WEEK IN THE COMPETITIVE SEASON

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Abstract The purpose of this study was to investigate the nutritional intake of semi-professional soccer players during a week in the competitive season. Sixteen Greek 4th national division soccer players volunteered to participate. Four players were identified as under-reporters and therefore the diets of 12 participants were included in the analysis. Their age, height, and body mass (BM) were 24.5 ± 1.1 years, 178 ± 2 cm, and 72.4 ± 1.6 kg, respectively (mean ± SE). Subjects recorded their diet during a week starting on Wednesday and finishing on Tuesday, with Sunday being the game day. Total energy intake was 11.8 ± 0.4 MJ and was derived from carbohydrate by 43 ± 1 %, fat by 39 ± 1 %, protein by 17 ± 1 %, and alcohol by less than 1 %. Throughout the recording period mean carbohydrate intake was 4.2 ± 0.1 g/kg BM and protein intake was 1.6 ± 0.1 g/kg BM, while the fibre intake was only 4.5 ± 0.3 g/1000 kcal. The pre-competition meal on the day of the game was also characterised by low carbohydrate content (43 ± 3 %), whereas its fat content was high (40 ± 3 %). Also, during the recovery period after the game the food intake of the players was not optimal for replenishing body carbohydrate stores. In terms of micronutrient intake, players met the Dietary Reference Intakes with the exception of folic acid, magnesium and vitamins D and E. The diet of the semi-professional soccer players was characterised by low carbohydrate intake, high fat content, and low fibre consumption, whereas the amount of proteins was at satisfactory level.

Key words: diet, game day, macronutrients, micronutrients

INTRODUCTION

Soccer is the most popular team game, which in the last two decades has received much attention by sports scientists. Recent developments in technology have allowed more accurate measurements in the field and in the laboratory regarding the activity pattern of the game as well as its physiological and metabolic demands during training and competition [2]. The game is characterised by periods of low to moderate aerobic exercise interrupted by frequent activities of short duration and high intensity, such as sprinting, jumping, and tackling [2]. It is obvious that such an energy-demanding sport requires proper dietary programmes that will restore or even super-compensate body energy stores and enhance the activity pattern of players during training and competition [7].

Many investigators have studied the dietary habits of soccer players in an attempt to examine whether the reported diets fulfil dietary recommendations [6]. The vast majority of these studies have examined players at elite [24, 36], Olympic [31], or professional [3, 9, 15, 29, 30] level. A large number of players, however, compete at a semi-professional level that is usually a pool from which not elite but professional clubs choose their members to form their squads. In Greece for example, semi-professional soccer players account for more than 10 % of the total number of soccer players who compete at all levels (professional, semi-professional, amateur), whereas professionals do not represent more than 3-4 %. Few studies have examined the dietary habits of lower level soccer players [17, 32, 35].

Furthermore, another aspect of particular importance that has not received much attention is the diet of soccer players during the game day and especially the pre-competition meal and the food they consume during after-game recovery. A proper pre-game meal will facilitate body energy stores before competition by helping to 'top up' muscle and liver glycogen stores [37], something that may enable players to cover greater distances in the field and at higher speeds than they would with suboptimal glycogen levels [33]. Also, optimal dietary intake in the hours after the game will ensure rapid recovery [7]. Therefore, the purpose of the present study was to examine the dietary intake of semi-professional soccer players during a week in the competitive season and to further analyse their diets before and after a formal game.

METHODS

SAMPLES

Sixteen male Greek soccer players volunteered to participate in the study. Four players were identified as under-reporters and were excluded from the dietary analysis. The age, height, body mass (BM), and body mass index of the soccer players were 24.5 ± 1.1 years, 178 ± 2 cm, 72.4 ± 1.6 kg, and 22.9 ± 0.5 kg/m^2 (mean ± SE), respectively. Before participation an informed consent was obtained in accordance with the University of Athens Ethics Committee requirements. The players participated at semi-professional level (4th National Division) and were members of two different soccer teams. The length of the season lasted 9 months (September-May). The volunteers had a history of 5 ± 1 years at competitive level and trained four times per week for about 90 min. They participated in one formal competition every week and had no training the day before and the day after competition.

DIETARY INTAKE COLLECTION AND ANALYSIS

Dietary intake was assessed using a 7-day food record. The players were requested to record all food items and beverages consumed except for water. The subjects were also trained to describe food portion sizes using household measures such as cups, dishes and spoons, and detailed verbal and written instructions were provided by a registered dietitian on how to record food consumption. Brand names, methods of preparation and recipes for the mixed dishes consumed were requested.

Furthermore, food record diaries were inspected within 3 days of completion to ensure proper record keeping and to solve any difficulties. The time of the meals or snacks was also recorded. The dietary recording started on Wednesday and was completed on Tuesday. The game day was on Sunday. It was a home game so that subjects could be at home during the study, eating their normal diet, and not at a hotel, where their food choices might have been different. All players under study participated in the game for its whole duration. Dietary records were analysed by converting food unit assessments into weights. The nutrient values were then calculated by the use of a food database developed in our laboratory based on published data [13]. In addition to energy, food records were evaluated for carbohydrates, fats, proteins, alcohol, fibre, and cholesterol. For the above macronutrients total grams, grams per kg BM, and percentages of total energy were calculated. The intake of the micronutrients including calcium, iron, sodium, potassium, magnesium, phosphorus, copper, zinc, chloride, manganese, selenium, iodine, and vitamins A, B_1, B_2, B_3, B_5, B_6, B_7, folic acid, B_{12}, C, D, and E was also evaluated. The game day was further analysed to study dietary behaviour before, during, and after the game, in order to identify whether players fulfilled the guidelines of pre-game and recovery dietary intake. Therefore, the pre-game meal and everything that was consumed except for water during the game or every 2 hours in the recovery period are presented separately.

ASSESSMENT OF UNDER-REPORTING

To identify dietary under-reporting, the ratio of energy intake (EI) to basal metabolic rate (BMR) according to Goldberg and co-workers [16] as modified by Black [4] for within-subject variation in estimated BMR, and for total between-subject variation in physical activity level (PAL) was estimated. Energy intake was calculated from dietary records and BMR was estimated using the equation by Schofield and co-workers based on BM, height, age, and gender [34]. Soccer players were not engaged in vigorous physical activities every day since they had two days rest, one before and one after every game. Furthermore, in professional soccer players who trained every day and competed in 2 games every week, PAL was actually measured and found to be 2.11 [9]. Therefore, in the present study PAL for calculating the cut-off value for under-reporting was selected to be 1.78 [10]. The calculated cut-off value for EI to BMR for this study was 1.21. Four of the initial sixteen soccer players who had EI to BMR less than 1.21 were classified as under-reporters and therefore were excluded from further analysis. The average EI to BMR in this study was 1.59 ± 0.05 (range: 1.32-1.91).

STATISTICAL ANALYSIS

Statistical analysis was performed by SPSS (SPSS, Inc., Chicago, IL, USA, version 15.0). One-way ANOVA with repeated measurements was used to examine differences in energy and macronutrient intakes throughout the 7-day recording period. Pairwise comparisons were performed through simple main effect analysis with Bonferroni adjustment for multiple comparisons to identify a significant main effect. Linear correlation analysis was done by Pearson's product-moment correlation to identify correlations between energy intake and selective micronutrients. Data are reported as means ± SE. Statistical significance was set at $p < 0.05$.

RESULTS

The energy and macronutrient intake of the soccer players in addition to the distribution from energy-providing nutrients are shown in Table 1. No difference was observed in energy, fat, protein, fibre, cholesterol, and alcohol intakes throughout the 7-day recording period. Carbohydrate intake was significantly higher on Friday (377 ± 24 g) compared to Thursday (284 ± 23 g), Sunday (game day) (232 ± 19 g), and Monday (284 ± 22 g). The energy derived from carbohydrates was significantly higher on Friday (47 ± 2 %) compared to Sunday (38 ± 2 %), whereas the energy derived from fat was significantly lower on Friday (36 ± 2 %) compared to Sunday (45 ± 1 %). Mean carbohydrate intake per kg BM was 4.2 ± 0.1 g/kg BM. With respect to protein intake the soccer players exceeded the recommended amount of 1.4 g/kg BM for endurance athletes [1] but their protein intake was within the range of recommendations (1.4-1.7 g/kg BM) for soccer players [28]. Fat comprised 39 ± 1 % of the total energy intake, ca. 43 ± 1 % of the total energy intake was derived from carbohydrates, ca. 17 ± 1 % from protein and less than 1% was derived from alcohol. The contribution of monounsaturated and saturated fats was 15 ± 1 % of the total energy intake for each type, a value that exceeds the recommended levels for a healthy diet (< 10-15 % for monounsaturated and < 10 % for saturated) [19]. On the other hand, polyunsaturated fats contributed to 5 % of the total energy intake, that is, within the recommended levels (< 10 %) [19]. Also, the total fibre intake expressed in g per 1000 kcal of energy intake was very low (4.5 ± 0.3 g/1000 kcal) compared to the Dietary Reference Intakes (DRI) (14 g/1000 kcal) [19].

The amount of each micronutrient was expressed in percentage of the DRI [18, 20-22]. With the exception of folic acid, magnesium, and vitamins D and E, players met the DRI values for the micronutrients under the dietary analysis. The % DRI values for folic acid, magnesium, vitamin D and vitamin E were 67 ± 5 %, 79 ± 4 %, 68 ± 9 %, and 67 ± 8 %, respectively, whereas for the other micronutrients the % DRI ranged from 117 % to 258 %. It should be mentioned that food supplements were not used by the soccer players.

The macronutrient intake consumed on the competition day as a pre-game meal, as well as the macronutrient intake consumed during the recovery period are presented in Table 2. In fact, the 6-hour recovery period after the game was divided into three 2-hour periods. Apart from water that was not recorded, the players did not receive any supplements or food in solid or liquid form during the game or during the half-time period. The amount of carbohydrate intake in the pre-game meal was 1.1 ± 0.1 g/kg BM but the fat content was high and comprised 40 ± 3 % of the energy intake of the meal. All subjects ate within 4 hours of recovery. However, only seven of the 12 subjects ate within the first two hours after the game (Table 2), and the amount of carbohydrate consumed during that period was below 1 g/kg BM (0.7 ± 0.2 g/kg BM). During the whole 6-hour recovery period the average carbohydrate intake was 1.3 ± 0.2 g/kg BM whereas there was a great variation among the players (0.2-2.2 g/kg BM).

DISCUSSION

In the present study the average daily energy intake of the players was 11.8 ± 0.4 MJ and corresponded to163 ± 6 kJ/kg BM. This value is much lower compared to energy intakes reported for professional [3, 15, 24, 36], or Olympic level [31] soccer players that exceeded 190-200 kJ/kg BM (Table 3). However, other studies have reported energy intakes of ca. 170 kJ/kg BM for professional [29, 30], or club level players [32], or as low as 137 kJ/kg BM even for professionals [29]. An obvious reason for the lower energy intake observed in the present study as compared to other investigations might be the lower level of activity of the players in this study compared to professional or national level athletes [3, 15, 24, 30, 31, 36], as well as the small sample size of the study which may not be representative for all semi-professional soccer players. Another reason for the lower energy intake as well as for the variability in the literature is the possibility that athletes under-report their food consumption when taking part in dietary survey studies or/and restrict their dietary intake during the recording period [6]. To reduce the incidence of under-reporting, the ratio of EI to BMR was used [4, 16]. Also, the subjects of this study were not in special populations who are more likely to under-report such as elderly, people with lower physical activity, or with high body mass indices [25]. However, in a study where more sophisticated techniques were employed for direct measurement of energy expenditure, soccer players reported energy intake that was 12 % lower to energy expenditure probably due to under-reporting [9]. Therefore, the possibility that some degree of under-reporting may still exist beyond the cut-off value for EI to BMR adopted in the present study should not be excluded.

Body carbohydrate stores in the form of muscle and liver glycogen are the major contributors to energy supply during a soccer game [2]. However, a substantial degree of variability has been observed concerning the fuel needs of different players even in the same team [7]. Although this makes it difficult to formulate certain guidelines, experts suggest that on a daily basis soccer players may need 5-7 g of carbohydrate per kg BM during moderate training periods, rising to ca. 10g/kg during intense training or game [12]. In literature, however, daily carbohydrate intakes for professional players have been reported to be higher than 8 g/kg BM [24, 31], or even lower than 6 g/kg BM [3, 29, 30, 36] (Table 3). In the present study soccer players had an average daily carbohydrate intake of 4.2 g/kg BM. This is a lower value than that of 5 g/kg BM that is the minimum intake level recommended for soccer players who are characterized as 'less mobile' and undergo a moderate training programme [7]. This low carbohydrate intake was probably the result of a low energy intake and a low percentage of energy derived from carbohydrates (Table 1). This inadequate carbohydrate intake is likely due to low consumption of breads, cereals, fruits and vegetables that are the main sources of dietary carbohydrates [11]. This explains the very low levels of dietary fibre reported by the participants in the present study (4.5 g/1000 kcal) that were below half of the recommended [19]. On Friday players consumed significantly more carbohydrates. This day was also characterized by the highest energy intake (Table 1) although this was not statistically significant. Although no objective measures of exercise intensity during training were made in this study, the players reported that on that day they had the hardest training session of the week. However, this cannot explain their higher preference on carbohydrates for that particular day.

Soccer players are advised to consume ca. 1.4-1.7 g/kg protein on a daily basis in order to have an adequate intake for this macronutrient [27, 28]. The players in the present study fulfilled these requirements since their reported protein intake was 1.6 g/kg/day. Similar intakes for protein have been reported for professional [30, 36], adolescent [5, 14], or club level players [32], but intakes that exceed 2 g/kg/day have also been reported for professionals [24, 31] (Table 3). It should be noted that the subjects of this study received no protein supplements. Therefore, these data indicate that players can easily meet protein requirements without any protein supplementation.

In the present study fat content (39 %) was in excess of that recommended (< 30 %) [8]. Also, the quality of fat consumed was relatively poor since saturated fatty acids comprised 15 % of the total energy intake exceeding the recommended levels (< 10 %), while cholesterol intake exceeded the recommendation for no more than 100 mg per 4.184 MJ [19]. Club level players, who train four times per week and play one game every week, as in the case of the players of this study, have reported similar fat intakes [32]. Furthermore, other researchers who have also examined Greek athletes in aquatic sports have observed high fat intakes [11, 26]. An obvious consequence of this high fat consumption is a reduced dietary carbohydrate intake observed in the present work as well as in previous studies, where fat exceeded 35 % of the total energy intake [11, 26, 32].

Although exercise may increase the needs for vitamins and minerals it is assumed that the current DRIs are appropriate for athletes [1]. In the present study the players fulfilled the DRI requirements for the majority of micronutrients with the exception of folic acid, vitamins D and E, and magnesium. Deficiencies in these micronutrients have also been observed in Greek aquatic athletes [11, 26] and in adolescent soccer players [5, 14]. A possible reason for these inadequacies might be a low energy intake since restriction of energy intake increases the risk of poor micronutrient status [1]. In the present study a significant correlation was found between energy intake and vitamins D ($r = 0.74$, $p < 0.01$) and E ($r = 0.68$, $p < 0.05$). However, folic acid and magnesium intakes were not significantly correlated with total energy intake. Considering vitamin D it should be noted that it can be obtained both exogenously through diet and endogenously from exposure of the skin to sunlight [18]. The present study was conducted in May when in Greece there are long hours of sunlight. Also the players were exposed to sunlight during training or competition for at least 5 days a week. Therefore, it is possible that the cutaneous production of vitamin D met their requirements. A possible reason for the low intake of vitamin E, magnesium and folic acid might be a relative lack of consumption of vegetables and legumes [11, 14].

A pre-exercise meal rich in carbohydrates ingested 3 h before endurance exercise will increase muscle glycogen levels and delay the onset of fatigue [37]. In the present study the pre-competition meal that the players consumed was ingested about 3-4 h before the game and it was characterised by a high fat content (40 %), whereas its carbohydrate content was low (43 %) (Table 2). Such meal composition is not recommended since a pre-competition meal should have a low fat content to facilitate absorption and should be rich in carbohydrates to top up body glycogen stores [37]. In terms of the food consumed during the recovery period only 7 players ate within the first 2 h after the game, whereas the amount of carbohydrates consumed was below the recommended 1.0-1.5 g/kg BM for achieving the optimum rate of muscle glycogen synthesis [1, 6]. If a person eats soon after exercise the rate of muscle glycogen resynthesis is high since glycogen synthase, the enzyme involved in glycogen synthesis, is very active during the immediate recovery period [23]. Therefore, eating within the first hour of recovery is critical for a fast replacement of body carbohydrate stores. However, the players of the present study had the following day off and therefore in theory could have replenished the post-game low glycogen stores during the following day. Nevertheless, neither in the following day of the game was their diet particularly high in carbohydrates (284 g or 3.9 g/kg BM). Also, it should be noted that on the game day the players reported the lowest carbohydrate intake (3.2 g/kg BM), whereas the fat content of the diet was highest in the week (45%) (Table 1). One may hypothesise that the fatigue the players experienced as a consequence of the competition together with the time they spent being involved in the game (travelling to the pitch, the warm-up and the game, leaving the pitch and travelling back home) disturbed their normal daily routine. This possibly made them pay even less attention to their diet than they had in the other days of the week, leading to inappropriate food choices and behaviour.

CONCLUSIONS AND PRACTICAL APPLICATION

The diet of the semi-professional soccer players participating in this study was characterised by low carbohydrate intake, high fat content, and low fibre consumption, whereas the amount of proteins was at satisfactory level. Similarly, the pre-game meal was low in carbohydrates and high in fat while the dietary intake during recovery was not optimal for the replacement of the body carbohydrate stores.

However, due to the small sample size of the study the results should not be considered as conclusive for semi-professional soccer players in general. Therefore, more studies should be conducted so that a clearer picture at this competition level is obtained. If future studies confirm the data of the present investigation these players should be given proper advice and guidance in order to improve their dietary habits.

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Table 1. Average (mean ± SE) of energy, macronutrient, alcohol, cholesterol, and fibre intake of soccer players throughout the week. Parentheses include the range of values

Nutrient	*Wednesday*	*Thursday*	*Friday*	*Saturday*	*Sunday (Game)*	*Monday*	*Tuesday*	*Average*
E. I. (MJ)	13.1 ± 0.9 (9.9-17.9)	10.4 ± 0.6 (7.5-14.4)	13.7 ± 1.1 (9.4-21)	13.3 ± 0.9 (7.9-19.1)	10.5 ± 1 (7.4-15.8)	10.8 ± 0.6 (8.1-14.5)	10.7 ± 0.5 (8.2-13.3)	11.8 ± 0.4
CHO (g)	343 ± 23 (246-491)	284 ± 23* (164-438)	377 ± 25 (265-539)	329 ± 24 (188-504)	232 ± 19* (147-311)	284 ± 22* (195-383)	289 ± 18 (194-390)	305 ± 12
Protein (g)	143 ± 12 (72-205)	103 ± 6 (78-154)	129 ± 12 (87-197)	120 ± 12 (70-182)	109 ± 15 (59-191)	100 ± 9 (74-161)	112 ± 6 (79-140)	117 ± 6
Fat (g)	133 ± 14 (68-205)	104 ± 6 (72-128)	134 ± 15 (75-244)	148 ± 14 (63-213)	125 ± 14 (71-199)	155 ± 9 (63-163)	105 ± 10 (55-174)	123 ± 7
E. I. (kJ/kg BM)	182 ± 13 (132-251)	144 ± 7 (108-179)	190 ± 15 (134-281)	184 ± 12 (116-271)	145 ± 13 (111-231)	150 ± 9 (109-213)	148 ± 7 (111-192)	163 ± 6
CHO (g/kg BM)	4.7 ± 0.3 (3.3-6.2)	3.9 ± 0.3 (2.4-5.2)	5.2 ± 0.4 (3.2-6.5)	4.5 ± 0.3 (2.8-6.1)	3.2 ± 0.3 (2.1-4.6)	3.9 ± 0.3 (2.7-5.0)	4.0 ± 0.2 (2.7-5.3)	4.2 ± 0.1
Protein (g/kg BM)	2.0 ± 0.2 (1.0-2.9)	1.4 ± 0.1 (1.1-1.8)	1.8 ± 0.2 (1.2-3.0)	1.7 ± 0.2 (1.0-2.8)	1.5 ± 0.2 (0.8-2.8)	1.4 ± 0.1 (1.0-2.4)	1.6 ± 0.1 (1.1-2.0)	1.6 ± 0.1
CHO (% of Total E. I.)	44 ± 2 (34-55)	45 ± 2 (30-51)	47 ± 2 (37-54)	41 ± 2 (37-60)	38 ± 2* (29-52)	44 ± 2 (36-55)	45 ± 3 (30-59)	43 ± 1
Protein (% of Total E. I.)	18 ± 1 (12-23)	17 ± 1 (13-26)	16 ± 1 (13-19)	15 ± 1 (9-21)	17 ± 2 (11-28)	15 ± 1 (11-19)	18 ± 1 (14-22)	17 ± 1
Fat (% of Total E. I.)	38 ± 2 (24-49)	38 ± 2 (31-48)	36 ± 2 (27-44)	41 ± 2 (26-49)	45 ± 1* (35-49)	40 ± 2 (29-56)	36 ± 3 (25-53)	39 ± 1
Alcohol (g)	0	1 ± 1 (0-13)	7 ± 4 (0-37)	9 ± 4 (0-32)	1 ± 1 (0-13)	3 ± 2 (0-25)	2 ± 1 (0-13)	3.4 ± 1
Cholesterol (mg)	464 ± 70 (178-655)	306 ± 53 (79-739)	437 ± 71 (179-1027)	449 ± 73 (206-1078)	396 ± 72 (84-623)	309 ± 60 (105-769)	379 ± 54 (163-753)	391 ± 36
Fibre (g/1000 kcal)	5.4 ± 0.6 (2.7-7.6)	4.3 ± 0.3 (2.6-6.4)	4.4 ± 0.3 (2.8-6.3)	3.6 ± 0.4 (2.3-7.6)	4.3 ± 0.5 (1.4-6.8)	4.9 ± 0.4 (3.6-7.6)	5.0 ± 0.6 (3.6-7.6)	4.5 ± 0.3

E. I. = Energy Intake; CHO = Carbohydrate; BM = Body Mass ; *Different from Friday ($p < 0.05$).

Table 2. Energy (kJ/kg BM), and macronutrient (g/kg BM) intake in pre-game meal and post-game recovery periods for every player. Parentheses include the % of total energy intake derived from each macronutrient

	Pre-Game Meal				***Recovery Period 0-2 hours***				***Recovery Period 2-4 hours***				***Recovery Period 4-6 hours***				
Sub.	E.I.	C (% C)	P (% P)	F (% F)	E.I.	C (% C)	P (% P)	F (% F)	E.I.	C (% C)	P (% P)	F (% F)	E.I.	C (% C)	P (% P)	F (% F)	***Total C (g/ kg BM)***
1	47	1.2 (43)	0.3 (12)	0.6 (45)	26	0.5 (30)	0.2 (13)	0.4 (57)	10	0.2 (28)	0.1 (20)	0.1 (52)	-	-	-	-	**0.7**
2	82	1.3 (27)	1.0 (21)	1.1 (52)	6	0.3 (92)	0.02 (5)	0.01 (2)	-	-	-	-	58	0.7 (21)	0.9 (27)	0.8 (52)	**1.0**
3	26	0.8 (52)	0.1 (6)	0.3 (41)	-	-	-	-	128	2 (26)	1.3 (18)	1.9 (56)	-	-	-	-	**2.0**
4	19	0.7 (59)	0.2 (17)	0.1 (24)	-	-	-	-	71	1.4 (33)	0.2 (5)	1.2 (62)	30	0.8 (43)	0.1 (6)	0.4 (51)	**2.2**
5	65	1.9 (49)	0.2 (5)	0.8 (46)	38	1.2 (53)	0.2 (11)	0.4 (36)	-	-	-	-	30	0.5 (30)	0.4 (21)	0.4 (49)	**1.7**
6	25	0.5 (36)	0.4 (30)	0.3 (38)	29	0.2 (13)	0.2 (14)	0.6 (73)	31	0.5 (27)	0.5 (29)	0.4 (44)	-	-	-	-	**0.7**
7	21	0.5 (37)	0.2 (19)	0.2 (44)	73	1.6 (37)	0.8 (17)	0.9 (46)	-	-	-	-	8	0.2 (44)	0.04 (8)	0.1 (48)	**1.8**
8	48	1.4 (48)	0.4 (15)	0.5 (37)	-	-	-	-	12	0.7 (100)	0 (0)	0 (0)	40	0.8 (36)	0.4 (16)	0.5 (48)	**1.5**
9	63	1.3 (34)	0.9 (24)	0.7 (42)	21	0	0.8 (65)	0.2 (35)	10	0.2 (28)	0.1 (20)	0.1 (52)	-	-	-	-	**0.2**
10	74	1.4 (32)	0.7 (15)	1.0 (54)	-	-	-	-	16	0.03 (3)	0.5 (50)	0.2 (47)	75	1.4 (32)	0.9 (21)	0.9 (47)	**1.4**
11	32	0.8 (45)	0.6 (30)	0.2 (25)	-	-	-	-	87	1.5 (30)	1.0 (20)	1.2 (50)	-	-	-	-	**1.5**
12	30	1.1 (58)	0.2 (13)	0.2 (28)	46	0.8 (28)	0.6 (23)	0.6 (49)	-	-	-	-	-	-	-	-	**0.8**
Mean	**44**	**1.1 (43)**	**0.4 (17)**	**0.5 (40)**	**34**	**0.7 (32)**	**0.4 (20)**	**0.4 (48)**	**46**	**0.8 (34)**	**0.5 (20)**	**0.6 (46)**	**40**	**0.7 (34)**	**0.5 (16)**	**0.5 (50)**	1.3
SE	**6**	**0.1 (3)**	**0.1 (2)**	**0.1 (3)**	**8**	**0.2 (11)**	**0.1 (8)**	**0.1 (8)**	**16**	**0.3 (10)**	**0.2 (5)**	**0.2 (7)**	**9**	**0.2 (3)**	**0.1 (3)**	**0.1 (1)**	0.2

Sub.= Subject; BM = Body Mass; E.I. = Energy Intake; C = Carbohydrate; P = Protein; F = Fat; Total C = Total carbohydrate intake during the 6-hour recovery period.

Table 3. Reported dietary intakes of male soccer players

Reference Number	*Players*	*Period & Method*	*Age (years)*	*Energy*		*Carbohydrates*			*Protein*			*Fat*	
				MJ	**kj/kg BM**	**g**	**g/kg BM**	**% E**	**g**	**g/kg BM**	**% E**	**g**	**% E**
3	7 P	10 days HM	23	15.7	204	426	5.5	46	144	1.9	16	152	38
5	11 A	7 days HM	15	9.8	163	299	4.9	51	101	1.7	18	n.r.	31
9	7 P	7 days HM	22	13	186	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.	n.r.
14	62 A	5 days WFR	16-17	11.5-13.2	158-189	316-392	4.4-5.6	46-50	111-114	1.5-1.6	14-16	101-114	33
15	20 P	4 days HM	25	15.2	214	509	7.1	56	145	2	16	114	28
17	17 C	3 Days HM	20	12.8-18.7	178-260	306-596	4.2-8.3	42-52	n.r.	n.r	14-16	n.r.	32-42
24	15 P	7 Days HM	24	20.7	282	596	8.1	47	170	2.3	14	217	29
29	51 P	7 days WFR	23-26	11-12.8	137-171	354-397	4.4-5.3	48-51	103-108	1.3-1.4	14-16	93-118	32-35
30	21 P	7 Days HM	21	12.8	173	437	5.9	57	115	1.6	15	94	28
31	8 OT	12 Days HM	17	16.5	260	526	8.3	53	143	2.3	14	142	32
32	24 Cl	3 Days HM	21	12.7	174	334	4.6	45	133	1.8	18	128	38
35	8 C	3 Days HM	n.r.	12.4	n.r.	320	n.r.	43	113	n.r.	16	135	41
36	20 P	4-7 Days HM	20	14.3	192	420	5.6	47	111	1.5	13	134	35

BM = Body Mass; % E = % of Energy; P = Professionals; HM = Household Measures; A = Adolescents; n.r. = not reported; WFR = Weighed Food Records; C = Collegiate Players; OT = Olympic Team Players; Cl = Club Level Players.