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Research Article

Comparison of Dietary Intakes and Quality of Professional and Amateur Young Football Players

Beril Köse[1]*, Esen Yeşil[1], Merve Özdemir[1] and Aysu Ayhan[2]

[1]Department of Nutrition and Dietetics, Başkent University Faculty of Health Sciences, Ankara, Turkey

[2]İncek Physical Therapy and Rehabilitation Hospital, Ankara, Turkey

***Corresponding Author:** Beril Köse, Department of Nutrition and Dietetics, Başkent University Faculty of Health Sciences, Ankara, Turkey.

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Abstract

Introduction: Nutritional requirements are higher in adolescence than in other life phases. These requirements are necessary not only for maintaining health and supporting growth and development, but also for providing energy for physical activities. In this case, the need for adequate energy and nutrient intakes becomes especially important for young athletes.

Methods: The population of this study consists of 185 amateur and professional football players whom aged 13-17 years. A questionnaire with multiple-choice and open-ended questions and the Mediterranean Diet Quality Index (KIDMED) with questions on nutritional status of adolescents were administered. In addition, a food consumption record for 24 hours was obtained.

Results: The mean KIDMED score of amateur and professional football players was 6.9 ± 2.26. Accordingly, 9.8% of the amateur football players and 8.6% of the professional football players had low diet quality. The professional football players (1934.4 ± 611.08 kcal) had higher daily energy intake than the amateurs (1475.1 ± 538.60 kcal). A negative correlation was found between the KIDMED scores and body weight values of all footballers, and a positive correlation between their KIDMED scores and weekly training days.

Conclusions: The football players who participated in this study had low energy intake. Professional subjects had higher intakes of energy and macro and micro nutrients than amateurs. Both groups had similar diet quality.

Keywords: Nutrition; Health; Exercise; Diet Quality

Introduction

Nutritional requirements are higher in adolescence than in other life phases as bodily changes occurring during this period increase physical energy needs. These requirements are necessary not only for maintaining health and supporting growth and development, but also for providing energy for physical activities [1,2]. In this case, the need for adequate energy and nutrient intakes becomes especially important for young athletes [3]. In young athletes, it is difficult to make general recommendations for nutritional needs as their energy needs change significantly depending on age, growth and development levels [4].

If young athletes learn when and how to choose and consume right foods in line with their training programs, they can pursue these dietary behaviors in adulthood [5]. A negative energy balance caused by insufficient food intake has short- and long-term effects on growth, health, and physical performance (6). Unfortunately, malnutrition is a common problem among young athletes. Along with increasing demands and competitiveness, poor nutritional knowledge, behaviors and practices often impose several risks on athletes. Some studies suggest that athletes do not meet their nutritional needs and therefore do not reach their potential maximum performance. Young athletes should be encouraged to develop good

eating habits at an early age. Therefore, it is important to evaluate both nutritional status and habits of young football players [7,8].

In recent years, there has been a great deal of interest in identifying physical, physiological, and psychological characteristics useful for discovering talented football players [9]. Given the popularity and competitiveness of football, it is important to understand the basic needs of these athletes, develop programs to improve their dietary intakes, and increase their physical performances. It is important to provide these athletes with an appropriate nutritional counseling to ensure that they do not compromise their training or performance [10]. This is a particularly important issue for young football players, as several anthropometric changes in adolescence can affect football players' sports performance in later periods and can be decisive for their sports career [7].

Although football is currently the most popular sport in the world, there is a limited number of studies on nutritional status of football players. One study has reported that total energy intake is often insufficient in football players [7]. Today, a strong emphasis should be placed on the importance of nutrition and body composition of young athletes in order to reconsider their food intakes and dietary behaviors and to increase their training performances [11]. In this regard, this study aims to evaluate the nutritional knowledge, consumption and habits of professional and amateur young football players.

Materials and Methods

The population of this study consists of football players from a professional youth team of the Turkish Football Federation and those from an amateur youth team of the Ankara Amateur Sports Clubs Federation. The study sample consists of 185 football players from these professional and amateur youth teams. Professional and amateur football players aged between 13 and 17 years who agreed to participate in the study, have continued their training and do not have any illness, were included in the study. A written consent form was received from those included in the sample, whereby they voluntarily participated in the study.

A questionnaire with multiple-choice and open-ended questions and the Mediterranean Diet Quality Index (KIDMED) with questions on nutritional status of adolescents were administered by the researcher making face-to-face interviews with football players to determine their general knowledge on sports. KIDMED was developed by Serra-Majem., *et al*. [12] to evaluate the compliance with the Mediterranean diet in children and adolescents. This index includes a total of 16 questions, scoring from 0 to 12 (negative items are scored -1 point and positive ones are scored +1 point). It includes 3 different dietary quality, where a KIDMED score ≥8 refers to optimal diet quality, between 4-7 to moderate diet quality (diet needs improvement), and ≤3 to very low diet quality [12]. In addition, a food consumption record for 24 hours was obtained from those who participated in the study. The Nutritional Information Systems Package Program (BEBIS) was used to evaluate the footballers' intakes of energy, macro and micro nutrients and compared with Institute of Medicine recommendations [13]. Height was measured with a fixed stadiometer with 1 mm precision. Body weight and fat mass were measured via Bioelectric Impedance Analysis (BIA) (TANITA UM-074).

The data were evaluated using the Statistical Package for Social Sciences (SPSS) 17.0. Qualitative/categorical variables were presented in number (N) and percentage (%) and quantitative variables were presented using mean (X) and standard deviation (SD). The Kolmogorov-Smirnov test was used to check the compliance of quantitative variables to normal distribution. Independent samples t-test and Mann-Whitney U test were used in comparison of the groups. A multiple regression analysis was performed to determine the predictive factors for KIDMED scores. In all statistical analyzes, $p < 0.05$ was considered statistically significant.

Results and Discussion

	Amateur (n = 92)		**Professional (n = 93)**		**Total (n = 185)**	
	X ± SD		**X ± SD**		**X ± SD**	
Age (year)	14.0 ± 1.62		14.8 ± 1.35		14.4 ± 1.54	
Height (cm)	166.6 ± 11.99		169.9 ± 11.34		168.3 ± 11.61	
Weight (kg)	53.6 ± 12.63		59.5 ± 11.64		56.6 ± 12.45	
Percentage of fat (%)	14.6 ± 6.74		10.7 ± 3.25		12.1 ± 5.09	
Sports age (year)	3.2 ± 1.98		5.0 ± 1.43		4.1 ± 1.93	
Daily Training Hours	1.7 ± 0.42		1.8 ± 0.28		1.7 ± 0.36	
Weekly Training Days	3.9 ± 1.28		4.3 ± 0.89		4.1 ± 1.12	
Category	**S**	**%**	**S**	**%**	**S**	**%**
U13	43	46.7	20	21.5	63	34.1
U14	10	10.9	22	23.7	32	17.3

U15	14	15.2	21	22.6	35	18.9
U16	18	19.6	17	18.3	35	18.9
U17	7	7.6	13	14.0	20	10.8
Position						
Goalkeeper	9	9.8	12	12.9	21	11.4
Defense	15	16.3	16	17.2	31	16.8
Stopper	16	17.4	15	16.1	31	16.8
Midfield	42	45.7	46	49.5	88	47.6
Striker	16	17.4	18	19.4	34	18.4
Living place						
House (with family)	92	100	76	81.7	168	90.8
House (alone)	0	0	1	1.1	1	0.5
Facility	0	0	12	12.9	12	6.5
Dormitory	0	0	4	4.3	4	2.2

Table 1: Demographic, Anthropometric Characteristics and Training Frequencies of Amateur and Professional Young Football Players.

Table 1 presents the demographic, anthropometric characteristics and training frequencies of amateur and professional young football players who participated in the study. The mean age of amateur and professional football players was 14.0 ± 1.62 and 14.8 ± 1.35 years, respectively. The mean height of amateur and professional football players was 166.6 ± 11.99 and 169.9 ± 11.34 cm, respectively. The mean body weight of amateur and professional football players was 53.6 ± 12.63 and 59.5 ± 11.64 kg. The mean body fat percentage of amateur and professional football players was 14.6 ± 6.74 and 10.7 ± 3.25 %, respectively. Of the football players, 11.4% were goalkeepers, 16.8% were defense players, 16.8% were stoppers, 47.6% were midfield players and 18.4% were strikers. The mean sports age was 3.2 ± 1.98 years for amateur football players, 5.0 ± 1.43 years for professional football players, and 4.1 ± 1.93 years for all participants. The mean daily training hours of all amateur and professional football players was 1.7 ± 0.36 hours (1.7 ± 0.42 and 1.8 ± 0.28 hours, respectively). The mean weekly training days of all amateur and professional footballers was 4.1 ± 1.12 days (3.9 ± 1.28 and 4.3 ± 0.89 days, respectively).

	Amateur (n = 92)		**Professional (n = 93)**		**Total (n = 185)**		**p**
KIDMED Score	**X ± SD**		**X ± SD**		**X ± SD**		
	6.9 ± 2.37		6.8 ± 2.17		6.9 ± 2.26		0.849
KIDMED Classification	n	%	n	%	n	%	
Low Dietary Quality	9	9.8	8	8.6	17	9.2	0.771
Moderate Dietary Quality	45	48.9	45	48.4	90	48.6	
Good Dietary Quality	38	41.3	40	43.0	78	42.2	
Total	92	100.0	93	100.0	185	100.0	

Table 2: Distribution of KIDMED Scores of Amateur and Professional Young Football Players.

Table 2 shows the distribution of KIDMED scores of amateur and professional football players. The mean KIDMED score of amateur and professional football players was 6.9 ± 2.26 (6.9 ± 2.37 and 6.8 ± 2.17, respectively). Accordingly, 9.8% of the amateur football players and 8.6% of the professional football players had low diet quality. The percentages of amateur and professional football players with moderate diet quality were 48.9% and 48.4%, respectively. Of all football players, 42.2% had good diet quality. No statistically significant difference was found between amateur and professional football players in terms of KIDMED score assessment ($p > 0.05$).

Energy and Macro Nutrients	**Amateur (n = 92)**	**Professional (n = 93)**	**Total (n = 185)**		
	X ± SD	**X ± SD**	**X ± SD**	**RDA**	**P**
Energy (kcal)	1475.1 ± 538.60	1934.4 ± 611.08	1705.9 ±619.05	2900	0.000[a]
Carbohydrate (g)	157.2 ± 71.62	206.3 ± 84.99	181.9 ± 82.18	435	0.000[a]
Carbohydrate (TE%)	42.8 ± 11.11	43.1 ± 9.18	42.9 ± 10.16	60	0.857[a]
Carbohydrate (g/kg)	3.3±1.61	3.5 ±1.49	3.3 ±1.55	6-10	0.160[b]
Protein (g)	69.7 ± 26.22	87.3 ± 30.28	78.5 ± 29.62	73-109	0.000[a]
Protein (TE%)	20.1 ± 5.56	18.7 ± 3.63	19.4 ± 4.72	10-15	0.135[a]
Protein (g/kg)	1.4 ± 0.55	1.5 ± 0.57	1.4 ± 0.58	1.2-1.7	0.306[b]
Fat (g)	60.5 ± 26.08	81.5 ± 28.25	71.0 ± 29.09	97↓	0.000[b]
Fat (TE%)	37.1 ± 9.76	38.2 ± 8.25	37.7 ± 9.03	30↓	0.415[b]
Fiber (g)	13.1 ± 9.54	17.4 ± 6.76	15.2 ± 8.52	29-38	0.001[b]
Cholesterol (mg)	334.1 ± 190.54	448.6 ± 179.53	391.6 ± 193.31	300↓	0.000[b]
Saturated fatty acid (%)	22.9 ± 9.84	31.9 ± 12.34	27.4 ± 12.03	10↓	0.000[b]
Vitamin A (mcg)	739.6 ± 449.77	1253.1 ± 2285.44	997.8 ±1666.72	900	0.000[a]
Vitamin E (mg)	9.6 ± 6.95	12.2 ± 7.18	10.9 ± 7.17	15	0.004[a]
Thiamine (mg)	0.6 ± 0.30	0.8 ± 0.30	0.7 ± 0.32	1.2	0.000[b]
Riboflavin (mg)	1.3 ± 0.70	1.6 ± 0.69	1.4 ± 0.71	1.3	0.003[b]
Niacin (mg)	10.0 ± 5.56	13.5 ± 6.89	11.8 ± 6.50	16	0.000[a]

Folate (mcg)	188.1 ± 87.31	265.1 ± 89.66	226.8 ± 96.33	400	0.000[b]
Vitamin B12 (mcg)	7.0 ± 11.03	7.2 ± 8.59	7.1 ± 9.86	2.4	0.405[a]
Vitamin C (mg)	71.0 ± 61.78	107.0 ± 65.96	89.1 ± 66.24	90	0.000[b]
Vitamin B6 (mg)	1.1 ± 0.53	1.5 ± 0.57	1.3 ± 0.58	1.3	0.000[b]
Potassium (mg)	1801.2 ± 831.10	2458.1 ± 925.48	2131.4 ± 937.19	3000	0.000[b]
Calcium (mg)	665.2 ± 356.13	879.3 ± 418.78	772.8 ± 402.41	1000	0.000[a]
Magnesium (mg)	200.8 ± 85.65	269.8 ± 92.49	235.5 ± 95.40	420	0.000[b]
Phosphor (mg)	1051.0 ± 395.32	1340.3 ± 438.54	1196.4 ± 441.01	700	0.000[b]
Iron (mg)	8.6 ± 4.27	10.7 ± 3.75	9.6 ± 4.15	8	0.000[b]
Zinc (mg)	9.2 ± 3.88	11.4 ± 4.31	10.3 ± 4.24	11	0.000[b]

Table 3: Daily Energy And Macro And Micro Nutrients Consumption Mean (X) And Standard Deviation Values Of Amateur And Professional Young Football Players.

[a]Mann-Whitney U Test, [b] Independent Samples t-test, RDA: Recommended Dietary Allowance [13].

Table 3 presents the football players' daily energy intakes and macro nutrient consumption amounts. Accordingly, the professional football players (1934.4 ± 611.08 kcal) had higher daily energy intake than the amateurs (1475.1 ± 538.60 kcal). Of the daily energy intakes of professional football players, 43.1 ± 9.18 % came from carbohydrates, 18.7 ± 3.63 % from proteins, and 38.2 ± 8.25 % from fats. Of the daily energy intakes of amateur football players, 42.8 ± 11.11% came from carbohydrates, 20.1 ± 5.56% from proteins, and 37.1 ± 9.76% from fats. The daily fiber consumption of professional football players was 17.4 ± 6.76 g, which was higher than that of amateur ones. Likewise, the daily cholesterol intake was higher in professional football players (448.6 ± 179.53 mg) and this difference was statistically significant ($p < 0.05$). Professional football players had higher vitamin A (1253.1 ± 2285.44 mcg) and vitamin E (12.2 ± 7.18 mg) intakes than amateur ones, and a statistically significant difference was found between them ($p < 0.05$). There were significant differences between the two groups in terms of thiamine, riboflavin and niacin intakes. Folate intake was found to be 188.1 ± 87.31 mcg in amateur football players, which was significantly lower than that of professional ones ($p < 0.05$). Both groups had similar vitamin B_{12} intakes (7.0 ± 11.03 for amateurs and 7.2 ± 8.59 mcg for professionals), whereby there was no statistically significant difference between them ($p > 0.05$). Professional football players had higher vitamin B_6 and C intakes than amateur ones ($p < 0.05$).

In addition, potassium and magnesium intakes were statistically significantly higher in professional football players (2458.1 ± 925.48 mg and 269.8 ± 92.49 mg, respectively) ($p < 0.05$). Calcium intakes were 665.2 ± 356.13 mg for amateur football players and 879.3 ± 418.78 mg for professional ones, and this difference was statistically significant ($p < 0.05$). The differences between the groups' daily average intakes of phosphorus, iron and zinc minerals were also found to be statistically significant ($p < 0.05$).

The results of this study are valuable because studying on adolescents is difficult and nutrition is very important in terms of their growth and development. Energy requirements are more variable in adolescent athletes, depending on age, activity level, growth rate and physical maturity stage. In this study, energy intake was found to be higher in professional adolescent athletes compared to amateurs. However, both groups had energy intakes below the RDA recommendations (<2900 kcal). This result was particularly highlighted. Similar energy intakes to the RDA recommendation were observed in studies involving athletes with similar ages to those in our study [7,15].

When we examined other macronutrient intakes, the total energy percentage of protein and fat was higher than the recommended rate, while carbohydrate was low. In fact, we know that these recommendations are for individuals who are not athletes. For this reason, it is more correct to call the recommendations low or high, and actually give suggestions suitable for individual exercise levels. However, the fact that the carbohydrate percentage of total energy intake is well below 60% is not a situation we recommend especially before training. Suboptimal carbohydrate intake can cause premature muscle glycogen depletion during training and competition, as well as poor glycogen re-synthesis after exercise, resulting in poor performance. Fats are critical for the absorption of fat-soluble vitamins. Fats are also essential fuel source for athletes and necessary for growth and development in adolescents. However, it is important to keep fat intake at an optimum level, as high intakes can cause problems (such as cardiovascular diseases), especially in

the long term. Protein is not the primary source of energy in light or short-term exercises, but proteins inhibit the reduction of blood glucose through liver gluconeogenesis as exercise duration increases. Similar to the presents study, studies have reported high protein intake among adolescents [15,16]. Therefore, it is not correct to recommend extra protein intake (e.g. protein powders or extracts) for them. In this study, cholesterol intakes of adolescents in parallel to their protein intakes were also found to be higher compared to the recommendations. Their dietary fiber intakes were quite low. Dietary fiber is especially important for gastrointestinal system. Therefore, athletes should be encouraged to take complex carbohydrates.

A statistically significant difference was found between the micronutrient intakes of amateur and professional footballers ($p < 0.001$). The professional football players had higher intakes of all macro and micro nutrients than amateurs. Our amateur playres had a lower intake of micro nutrients that met RDA values with regard to vitamin A, E, C, B_6, thiamine, niacin, folate, calcium, magnesium and zinc, while they had a higher intake of micro nutrients that met RDA values regarding only vitamin B_{12} and phosphorus. Riboflavin and iron intake were equal to RDA recommendations. Our professional players had a lower intake of micro nutrients that met RDA values with regard to vitamin E, thiamine, niacin, folate, calcium and magnesium, while they had a higher intake of micro nutrients that met RDA values regarding vitamin A, C, B_6, B_{12}, riboflavin and phosphorus and iron. Zinc were equal to RDA recommendations. Calcium requirement is particularly high during adolescence. An adequate calcium consumption is necessary for bone development in adolescents and increased bone burden in athletes, as well as in terms of possible osteoporosis risk in later years. However, as in our study, there is generally low calcium consumption in both sedentary adolescents and sports adolescents [8,16,17].

	Amateur (n = 92)							**Professional (n = 93)**						**Total (n = 185)**					
	Unstandardized Coefficient		Standardized Coefficient	t	p	R	R^2	Unstandardized Coefficient		Standardized Coefficient	t	p	R	R^2	Unstandardized Coefficient		Standardized Coefficient	t	p	R	R^E
	B	SE	β					B	SE	β					β	SE	β				
Age (year)	0.135	0.251	0.096	0.538	0.592	0.318	0.101	-0.158	0.287	-0.101	-0.550	0.584	0.255	0.065	0.014	0.182	0.079	0.079	0.937	0.265	0.070
Weight (kg)	-0.061	0.032	-0.334	-1.943	0.048*			-0.034	0.030	-0.188	-1.145	0.256			-0.049	0.021	-2.311	-2.311	0.022*		
Sports age (year)	0.191	0.132	0.169	1.442	0.153			0.221	0.183	0.146	1.210	0.230			-0.124	0.214	-0.580	1.235	0.219		
Weekly Training Hours	0.204	0.133	0.223	1.530	0.130			0.227	0.191	0.208	1.191	0.237			0.206	0.107	1.923	-0.580	0.563		
Weekly Training Days	-0.080	0.256	-0.044	-0.311	0.756			-0.100	0.418	-0.041	-0.238	0.812			0.118	0.096	1.235	1.973	0.046*		

Table 4: The Relationship Between Some Risk Factors And Kidmed Scores Of Amateur And Professional Young Football Players.

According to the results of multiple regression analysis, a negative correlation was found between the KIDMED scores and body weight values of amateur football players. A negative correlation was also found between the KIDMED scores and body weight values of all footballers, and a positive correlation between their KIDMED scores and weekly training days ($p < 0.05$).

Optimal fat percentage for adolescent athletes can be an advantage to performance. Professional athletes have lower percentage of fat compared to amateurs. According to the results of this study, as body weight increased in amateurs and all athletes, their KIDMED scores decreased, indicating the effect of body weight on diet quality. For all athletes, as weekly training days increased, their KIDMED scores increased, suggesting a

higher dietary quality in athletes who train more. Both groups had similar KIDMED scores. The number of athletes with good dietary quality was found to be higher in the present study compared to those on sedentary adolescents [18,19]. This may be because athletes may have more information about nutrition.

Conclusion

In conclusion, all the football players who participated in this study had low energy intake. Professional subjects had higher intakes of energy and macro and micro nutrients than amateurs. Both groups had similar diet quality.

Conflict of Interest

No financial interest or any conflict of interest exists.

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