FARUGA-LEWICKA, Wioleta, PIETRASZKO, Zuzanna, STAŚKIEWICZ, Wiktoria, KARDAS, Marek & KARDAS, Justyna. Eating Habits of Football Players Training in Sports Clubs in the Żywiec District. Journal of Education, Health and Sport. 2023;13(4):256-265. eISSN 2391-8306. DOI http://dx.doi.org/10.12775/JEHS.2023.13.04.030
https://apcz.umk.pl/JEHS/article/view/42667
https://zenodo.org/record/7687988

The journal has had 40 points in Ministry of Education and Science of Poland parametric evaluation. Annex to the announcement of the Minister of Education and Science of December 21, 2021. No. 32343.
Has a Journal's Unique Identifier: 201159. Scientific disciplines assigned: Physical Culture Sciences (Field of Medical sciences and health sciences); Health Sciences (Field of Medical Sciences and Health Sciences).
Punkty Ministerialne z 2019 - aktualny rok 40 punktów. Załącznik do komunikatu Ministra Edukacji i Nauki z dnia 21 grudnia 2021 r. Lp. 32343. Posiada Unikatowy Identyfikator Czasopisma: 201159.
Przypisane dyscypliny naukowe: Nauki o kulturze fizycznej (Dziedzina nauk medycznych i nauk o zdrowiu); Nauki o zdrowiu (Dziedzina nauk medycznych i nauk o zdrowiu).

The authors declare that there is no conflict of interests regarding the publication of this paper.
Received: 19.02.2023. Revised: 22.02.2023. Accepted: 01.03.2023.

Eating Habits of Football Players Training in Sports Clubs in the Żywiec District

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Abstract:
Background. Football is one of the most popular sports at both amateur and professional levels. The discipline is constantly evolving. At the same time, an increase in physiological demands can be observed. Players are exposed to significant energy expenditure. Therefore, it is necessary to ensure an adequate level of nutrition. The purpose of this study was to evaluate the diet and eating habits of football players training in sports clubs in the Żywiec district. Methods. The survey was conducted among football players who were players of football clubs in the Żywiec district. Only men were considered, and the study group consisted of 205 athletes. A questionnaire, which was made available as an electronic form, was used to obtain the results. The questionnaire used questions from the KomPAN questionnaire and the author's questions, which accounted for the bulk of the 35 questions. Results. The dietary quality of football players from the Żywiec district was found to be low. This is noticeable in the diet used on a daily basis, as well as considering nutrition around training or matches. Conclusions. Poor nutrition quality involves many aspects that require attention. This applies to both the frequency of consumption of certain foods and the eating habits practiced. Attention should be paid to improving match-day and training-day nutrition. Nutrition education in clubs should be emphasized.

Key Words: *football, diet, eating habits, football players*

Introduction

Football is a team sport with a variable pace, during which effort is irregular and intermittent, and activities are multidirectional [1]. Football is characterized by the high intensity in relation to the effort expended, and inherent in it is the need for proper recovery. It is not possible to accurately determine the energy expenditure per player, as much depends on the player's position on the field. Training adaptations, reduced recovery time, reduced susceptibility to injury, and improved exercise capacity all depend on an optimal supply of nutrients [2,3]. Elite football teams already recognize the need for appropriate nutritional interventions due to the increasing physiological demands on football players [4,5].

According to statistics, a football player covers an average distance of between 7 and 12 kilometers per game. This distance consists of walking (24%), trotting (36%), fast running (20%), and sprinting (11%) [6,7]. High-intensity sports moments and sprints currently take 30-80% more time than they used to. In a season, professional athletes play about 70 games in 45 weeks [6]. During match effort, aerobic metabolism dominates, while anaerobic metabolism dominates during sprints. High intensity promotes the use of carbohydrates stored in the form of glycogen in muscle and liver. Stores average 1200-1600 kcal, which is sufficient for about 90-180 minutes of running at 70-80% VO_2 max (maximal oxygen consumption). According to studies, the daily caloric requirement of football players is 3100-4000 kcal, while its final value is influenced by many factors. Adequate nutrient supply is essential to avoid excessive fatigue, lowering of football players' exercise capacity, weakening of the immune system, and injuries [8,9].

Recommendations for carbohydrate intake by football players

For football players, carbohydrates are the best and most desirable source of energy. The average requirement is in the range of 5-10 g/kg body weight/day. Carbohydrate stores in the body are limited compared to fat stores. However, they play the most significant role in a football player's performance due to the muscle glycogen stored in the muscles [10, 11]. Starting a match with full glycogen storage should be the standard, as otherwise, their depletion is a limiting factor for performance through reduced efficiency [12]. Players who start a match with low glycogen stores in their muscles cover less distance and achieve significantly lower speed compared to players whose muscles have been adequately saturated. The discrepancies are particularly evident in the second half of games [13]. Studies show that elevated glycogen levels before exercise through a high-carbohydrate diet improve performance during exercise. Such a diet may also be important when recovery time between training units or matches is limited [14,15]. Due to the varying energy requirements of athletes, a high carbohydrate intake is not required every day. It should be tailored individually to the physical needs of the athlete [16].

Consumption of large amounts of carbohydrates - in the range of 10 g/kg body weight/day - approximately 36 h before the match allows for the accumulation of high muscle glycogen stores [17]. It is recommended that carbohydrate intake be at least 6-8 g/kg body weight/day on the day before a match when training is usually light. Carbohydrate intake immediately before a match, according to current recommendations, should be in the range of 1 to 4 g/kg body weight along with a ratio of 1 to 4 hours before high-intensity exercise [12] or 1 to 3 g/kg body weight 3 to 4 hours before the start of the match [13].

Recommendations for protein intake by football players

General recommendations for football players are for protein intake in the range of 1.2 - 2.0 g/kg body weight/day [16] or 1.6 - 2.2 g/kg body weight/day to increase training adaptations [13]. An adequate supply of this macronutrient is essential for the proper functioning of the body, especially the skeletal and muscular systems. In studies, it has been observed that most athletes are able to meet and even exceed the requirements for the recommended protein consumption with the diet without the use of protein nutrients. If athletes opt for protein nutrients, the right choice would be whey protein (higher leucine content and digestibility) in doses of 0.3 - 0.4 g/kg body weight/meal. As reported by available sources, repair and adaptation of muscle fibers through optimized protein synthesis is achieved after planning meals providing 20 - 25 g of high-quality protein every 3 - 4 hours. The most favorable option would be to consume protein at a minimum of about 0.4 g/kg body weight/meal in three to four separate meals (with four meals, a daily intake of 1.6 g/kg body weight would be achieved). Protein consumed after exercise improves the rate of protein synthesis and accumulation in muscle, but the process is slow and no significant effect on improving muscle function is observed [13, 14].

Evening protein consumption, in light of studies, significantly supports the nocturnal phase of recovery. It has been established that a serving of protein of approximately 0.4 g/kg body weight at a meal 3 hours before entering the sleep phase or 0.5 g/kg body weight as a supplemental protein 1 - 2 h before bed (e.g. from protein supplements) will contribute to increased training adaptation during periods of high training loads. On the other hand, casein protein intake of 30 - 60 g in the evening (preferably before bedtime) improves nocturnal protein synthesis. In the case of fat reduction and a significant energy deficit in football players, it is possible to build muscle tissue at the same time. However, for this to be possible, a higher protein intake - oscillating at 2.0 - 2.4 g/kg body weight/day - is recommended in such a situation, which should be appropriately adjusted to training loads and metabolic stressors [18].

Recommendations for fat intake by football players

Fat in the diet of athletes is a valuable and long-lasting source of energy during physical activity, especially that of lower intensity, such as running or walking in football players. It also provides essential fatty acids: linoleic acid - omega-6 and α-linolenic acid - omega-3. It enables the absorption of 20 vitamins that are fat-soluble (i.e., vitamins A, D, E, and K), supports the production of hormones, or provides protection for internal organs [13].

To determine the amount of dietary fat required for an athlete, it is necessary to take into account the athlete's workload through current training requirements and goals. Dietary recommendations for athletes do not differ significantly from those for non-athletes. It has been established that the appropriate range will be 0.8 - 1.5 g/kg body weight/day of fat consumed. It is crucial to choose types of fat rationally. Some can cause inflammation in the body, have a negative impact on brain health and a footballer's abilities, and impede proper post-workout recovery. Such damage is mainly caused by the over-consumption of trans fats, saturated fats, and omega-6 fatty acids. Others can act in the opposite way and support the player's body. Such fats include those from the polyunsaturated fatty acid group, such as omega-3 [13]. Studies conducted indicate a correlation between these acids (especially EPA and DHA) with improved mitochondrial function and, consequently, enhanced energy cell metabolism. Soft tissue rehabilitation during injury should be linked to an adequate supply of the aforementioned fatty acids, as they exhibit strong anti-inflammatory effects that will speed up the recovery process. The slow digestion and absorption of fats require that they be supplied to the body in moderation and with caution before a match. Consuming fat-laden foods during a workout or match is very likely to contribute to gastrointestinal distress. Moreover, it can impair the use of carbohydrates as the main source of energy [16,18,19].

Recommendations for adequate hydration for football players

It is important to inform players about the benefits of consuming electrolyte drinks. As studies show, if water is the body's only source of hydration, exercise-related muscle contraction can be exacerbated and the time required to restore plasma volume can be as much as three times longer. Properly adjusted electrolyte beverages with a sodium content of more than 600 mg/L work in this situation as a preventive measure. Water balance is restored more quickly due to lower urine production and a faster increase in plasma volume [18].

There is no way to clearly define the average fluid requirements for a football player. This is because it depends on a number of individual conditions, including environmental conditions, acclimatization status, exercise intensity, sweating rate, and body weight and composition. Based on studies, it has been reported that the amount of sweat generated by men during matches and training ranges from 0.5 to 2.5 l/h [13-16]. The components of sweat are also electrolytes. The main one is sodium, but its concentration varies individually. Sodium contained in food or sports drinks assists the athlete with its effect of improving water absorption from the intestines and enhancing the thirst mechanism in the brain, resulting in additional fluid retention in the body. In the study, values of sodium loss of 700 to 1,500 mg sodium/l of sweat were recorded. Other electrolytes, namely potassium, magnesium, and calcium, are not lost at such high levels as sodium and can usually be replenished by a daily diet [15, 16]. The mechanisms involved in dehydration as a result of sweating have not yet been clearly outlined, but possible causes of impaired athlete performance such as excessive cardiovascular stress, cognitive impairment, increased perception of exertion, reduced physical performance, and technical skills are indicated. To prevent this, athletes should drink enough fluids to ensure that there is no deficit of > 2 - 3% of pre-workout body weight during exercise, but at the same time not affect body weight gain, thus ensuring optimal fluid replenishment [14].

Material & methods

Procedure. The survey was conducted between June and July 2022. It concerned a group of football players who, at the time of the study, were players training in sports clubs in the Zywiec district of Poland. The inclusion criterion for the study was age from 15 years old with no upper limit.

The study group consisted of 205 men between the ages of 15 and 49, whose training experience ranged from 0.5 years to 30 years. They trained from 1 to 18 hours per week, and the maximum number of matches they played per season was 40. A total of 17 clubs located in the Zywiec district participated in the study, whose games are played in several different leagues: IV league, district league, A class, B class, III provincial league A1 junior, II Silesian junior league.

The survey used a questionnaire created based on the KomPAN questionnaire, a questionnaire to study dietary views and habits for people between the ages of 16 and 65. This questionnaire is a refined and expanded version of the QEB questionnaire (a questionnaire for studying eating behavior and opinions on food and nutrition consisting of two parts and a metric). It contains four sequentially separated parts: eating habits, frequency of food consumption, views on food and nutrition, and lifestyle and personal information. The total number of questions is 111. However, most of the questions in the self-questionnaire were author's questions. The questionnaire consisted of three parts containing a total of 35 questions. The first part consisted of data necessary to the author for statistical purposes, which additionally included questions related to the football players' careers, the second part related to diet and eating habits on weekdays, and the third part consisted of questions about football players' diet and eating habits on training and match days, as well as the availability of resources that affect the quality of their diet during such days.

To obtain the results, the CAWI method (Computer-Assisted Web Interview) was used, a method in which the form was made available electronically on the respective football club websites, as well as directly to

club members.

Procedure/Test protocol/Skill test trial/Measure/Instruments. Nutritional status was assessed using the Body Mass Index (BMI). Height was measured using a SECA 213 stadiometer, while body mass was obtained by measuring with a SECA 769 balance. The results provided a basis for assessment of height-weight ratios in relation to standards for the European population and WHO recommendations (WHO "Body Mass Index – BMI").

BMI was calculated using the formula (WHO "Body Mass Index – BMI"):

$$BMI = \frac{\text{body mass [kg]}}{(\text{height [m]})^2}$$

According to the WHO (World Health Organization), the following ranges of values for BMI were adopted:

- <18.49 – Underweight,
- 18.5-24.99 - Normal weight,
- 25.0-29.99 – Overweight,
- >30.0 – Obese.

Data collection and analysis / Statistical analysi. Statistical analyses were performed using Statistica v.13.3 program (Stat Soft Polska) and R v. 4.0.0 package (2020) under GNU GPL license (The R Foundation for Statistical Computing).

In order to present quantitative data, mean values and standard deviations - X±S - were calculated. For qualitative data, percentage notation was used. Compliance with normal distribution was checked using the Shapiro-Wilk test). An analysis of qualitative characteristics was carried out, and for this purpose the 2 test and V-Cramer correlation were used.

A value of $p<0.05$ was used as a criterion for statistical significance.

Results

Among the male respondents, the most numerous group were football players whose ages ranged from 15-25: 130 (63%), the next group was respondents aged 26-30: 41 (20%), and there were slightly fewer respondents who were 31-40 years old: 28 (14%), and the smallest portion were those over 40: 6 (3%). Most of the subjects were men whose body mass index was within the normal range (53%). A slightly smaller group was overweight men (39%). The vast minority were athletes whose body mass index was in the range of being obese or underweight (5% and 3%, respectively). The information is shown in Figure 1.

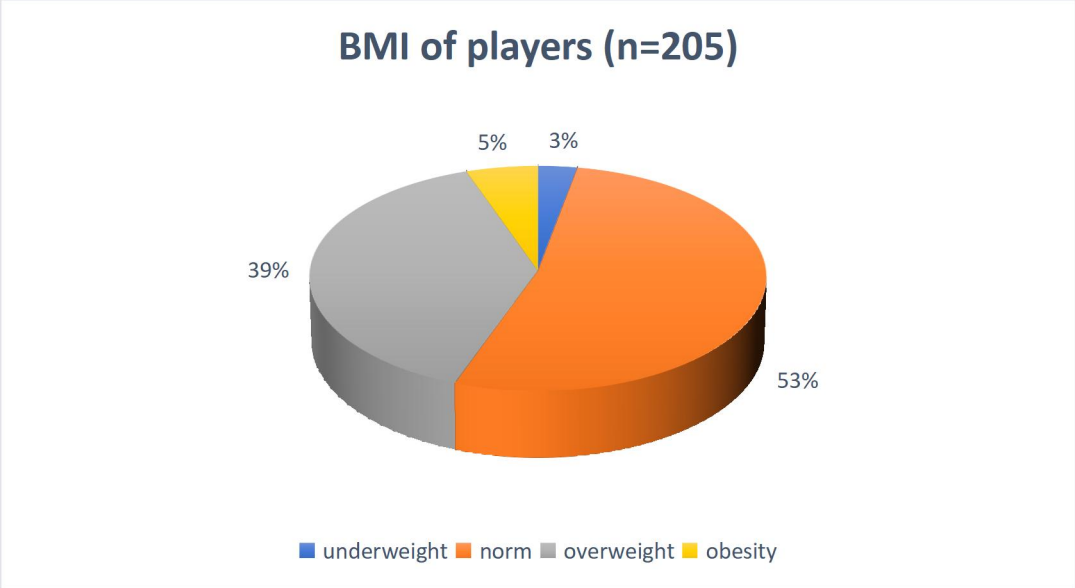

Figure 1. BMI of the players participating in the study.

The training seniority of the men varied significantly, but most of them started training 11-20 years ago (53%). The next fairly large group was athletes who had been training for 6-10 years (25%). The rest can be classified among those who have been training for not too long (9%), as the maximum was 5 years, or those who have been training for a very long time, i.e. practicing football for more than 20 years (12%). The average

training seniority was just under 13.69 years.

More than half of the football players surveyed said they eat 4 meals in a day (51%). The number of 3 meals was also a fairly common response (32%). Only 12% of respondents eat 5 or more meals per day, and only 5% eat 2 meals. The vast majority of football players from the Zywiec district maintain an interval of 3-4 h between meals (71%). Significantly fewer of the respondents gave answers indicating that they consume meals at intervals of 1-2 h (16%) and 5h or more (12%). A negligible percentage of respondents eat at intervals of less than 1 h (1%). Only 5% of football players answered that they never eat food between meals. The rest of the respondents eat food with varying frequency. Most of them, or 34%, said it happens to them several times a week. 23% eat food between meals once a day, and another 17% eat food several times a day. The lesser frequency of eating food amounting to eating food once a week and 1-3 times a month was indicated by 13% and 9% of respondents, respectively. The most commonly eaten food item in general is fruit (93%), although the frequency of consumption by respondents varies. They are usually eaten with a frequency of several times a week (31% of respondents). Another fairly frequently eaten product is yogurt, cheese and other unsweetened dairy products (88%), and they are mostly eaten between meals several times a week (25% of respondents). In contrast, the least frequently eaten products are dried fruits (55% of "never" responses), followed by other products not specified in the questionnaire (54% of "never" responses). The answers given by respondents indicate that the most frequently eaten product with regard to the "several times a day" answer is fruit.

Table 1. Frequency of consumption of selected product groups by the athletes participating in the study

Frequency of consumption of selected product groups						
	never n (X)	1-3 times a month n (X)	once a week n (X)	several times a week n (X)	once a day n (X)	several times a day n (X)
White bread	7 (3.41)	22 (11.11)	26 (13.13)	45 (22.73)	72 (36.36)	33 (16.67)
Whole wheat bread	4 (1.95)	29 (16.65)	54 (27.27)	67 (33.84)	38 (19.19)	13 (6.57)
Rice, white pasta, groats	2 (0.98)	26 (13.13)	57 (28.79)	97 (48.99)	15 (7.58)	8 (4.04)
Oatmeal, dark pasta, thick groats	19 (9.27)	40 (20.20)	49 (24.75)	74 (37.37)	17 (8.59)	6 (3.03)
Red meat	3 (1.46)	32 (16.16)	53 (26.77)	94 (47.47)	16 (8.08)	7 (3.54)
White meat	4 (1.95)	10 (5.05)	42 (21.21)	116 (58.59)	24 (12.12)	9 (4.55)
Fish	25 (12.20)	58 (29.29)	83 (41.92)	35 (17.68)	2 (1.01)	2 (1.01)
Legumes	48 (23.41)	78 (39.39)	42 (21.21)	32 (16.16)	2 (1.01)	3 (1.52)
Yellow cheeses, moldy	9 (4.29)	19 (9.60)	46 (23.23)	97 (48.99)	22 (11.11)	12 (6.06)
Sweetened dairy products	6 (2.93)	28 (14.14)	50 (25.25)	79 (39.90)	19 (9.60)	23 (11.62)
Unsweetened dairy products	24 (11.71)	29 (14.65)	43 (21.72)	77 (38.89)	16 (8.08)	16 (8.08)
Fermented food products	48 (21.62)	66 (33.33)	40 (20.20)	48 (24.24)	10 (5.05)	10 (5.05)
Fruits	9 (4.39)	18 (9.09)	26 (13.13)	86 (43.43)	40 (20.20)	26 (13.13)
Vegetables	11 (5.37)	17 (8.59)	20 (10.10)	93 (46.97)	35 (17.68)	29 (14.65)
Nuts, seeds, seeds without salt	30 (14.63)	76 (38.38)	37 (18.69)	41 (20.71)	11 (5.56)	10 (5.05)
Sweets, cakes	14 (6.83)	37 (18.69)	44 (22.22)	82 (41.41)	20 (10.10)	8 (4.04)
Fast food	8 (3.90)	91 (45.96)	59 (29.80)	32 (16.16)	9 (4.55)	6 (3.03)
Salty snacks	20 (9.76)	83 (41.92)	55 (27.78)	38 (19.19)	3 (1.52)	6 (3.03)

The results shown in Table 1 indicate that light breads are most often consumed with a frequency of once a day (35%), while whole-grain breads are consumed slightly less frequently, as the most frequently selected response was to eat several times a week (33%). Light pasta and fine groats are consumed more frequently than whole-grain pasta, coarse groats, or oatmeal (99% and 91%, respectively). A very similar number of respondents eat both types of meat - white and red. Both white and red meat are the most popular choices several times a week. The overall consumption of fish is 88% among all respondents. The predominant answer is consumption once a week (40%), and the next most frequently chosen answer is 1-3 times a month (28%). Yellow and moldy cheeses are readily consumed by respondents (96%), and the most common answer is consumption several times a week.

The results indicate that respondents are more likely to choose sweetened (97%) than unsweetened (88%) dairy

products, and both are most often consumed several times a week. Fermented foods are not particularly popular, with as many as 23% of respondents not consuming them at all. Those who consume them are most likely to choose them 1-3 times a month. Fruits and vegetables are usually chosen by surveyed football players several times a week. Only 13% consume fruits several times a day. The figure for vegetables is 14% of those surveyed. Nuts, seeds, seeds without breadcrumbs, and salt are consumed 1-3 times a month (37%) by the majority of respondents. Sweets are the most common choice several times a week (40%), fast food 1-3 times a month (44%) as are salty or breaded snacks (40%).

The question on the most frequently chosen type of fat indicates that almost half, or 45%, of football players, choose vegetable oil, with another 33% opting for butter. The least frequent answers given were that the respondent does not use any fat and the indication of lard (2% and 3%, respectively).

Respondents were most likely to indicate frying as the most frequently chosen method of thermal processing of food (44%). The next processing method they indicated quite often was roasting (28%), followed closely by grilling (13%). The least popular were stewing and boiling in water (6% and 9%).

The amount of fluids drunk by the surveyed athletes per day was most often 1.5-2l (49%). Slightly fewer respondents indicated drinking more than 2l fluids per day (44%). Only 7% drink less than 1.5l of fluids. Football players are most likely to choose mineral water for hydration (99%), as well as it is the most common fluid of choice for hydration by drinking it several times a day (61% of all responses regarding mineral water consumption). Detailed information is presented in Table 2.

Table 2. Frequency of consumption of selected fluids by athletes participating in the study

The most popular fluids for hydration								
	Mineral water n (X)	Coffee n (X)	Tea n (X)	Cocoa n (X)	Fruit and vegetable juices n (X)	Sweetened carbonated drinks n (X)	Carbonated drinks n (X)	Alcohol n (X)
never	2 (0.98)	43 (20.98)	17 (8.29)	64 (31.22)	16 (7.80)	26 (12.68)	37 (18.05)	34 (16.59)
1-3 times a month	5 (2.44)	13 (6.34)	11 (5.37)	85 (41.46)	40 (19.51)	51 (24.88)	60 (29.27)	57 (27.80)
once a week	13 (6.34)	13 (6.34)	34 (16.59)	43 (20.98)	40 (19.51)	47 (22.93)	55 (26.83)	65 (31.71)
several times a week	38 (18.54)	23 (11.22)	48 (23.41)	8 (3.90)	69 (33.66)	54 (26.34)	36 (17.56)	39 (19.02)
once a day	22 (10.73)	65 (31.71)	57 (27.80)	5 (2.44)	33 (16.10)	21 (10.24)	15 (7.32)	5 (2.44)
several times a day	125 (60.98)	48 (23.41)	38 (18.54)	0 (0.00)	7 (3.41)	6 (2.93)	2 (0.98)	5 (2.44)

As many as 61% of respondents skip eating breakfast with varying frequency. The largest group is made up of those to whom it happens several times a week (29%), and the smallest group is those to whom it happens every day (4%). The rest of those surveyed (39%) believe that they never skip eating breakfast.

The question about subjective evaluation of diet reported information that the majority of respondents believe they eat sufficiently (52%). 33% say their diet is good. Only 1% of those surveyed said they eat in a very bad way.

More than half of the football players surveyed only sometimes eat a meal before training or a match (51%), 32% do so routinely, while 32% of football players never eat. During training or a match, the statistics stack up quite differently, as 80% of respondents are in the group of those who do not consume a meal or snack during this time, and only 5% of players are in the group of those who always consume something. After training or a match, those who always consume a meal dominate (53%), while a minority are football players who never choose to consume food (9%).

Performing an analysis of the table, it can be seen that the most preferred type of beverage only during exercise is isotonic drinks (25%). After the workout, most of the responses point to alcohol (31%) as one of the dominant sources of fluids. Both during and after training, mineral water is very popular (83%). The least frequently consumed of the liquids listed in the table is coffee (81% do not drink it at all during and after training).

The question regarding the use of dietary supplements and/or sports nutrition indicated that 54% of football players in the Żywiec district use some form of supplementation.

The relationship between training seniority and frequency of fish consumption was tested. No statistically significant differences were noted (χ^2=2.99; p=0.22). No statistically significant differences were

noted between training seniority and red meat consumption (χ^2=0.97; p=0.61). No statistically significant differences were observed between training seniority and white meat consumption (χ^2=2.95; p=0.23). It was observed that there was a statistically significant relationship between training seniority and frequency of fruit consumption in (χ^2=9.06;p<0.05). The strength of the relationship (V Cramer) was 0.21 - a weak strength of the relationship. Statistically significant differences were noted between training seniority and vegetable intake (χ^2=10.80; p<0.05). The strength of the relationship (Cramer's V) was 0.23 - weak strength of the relationship. Statistically significant correlations were found between training length and frequency of meal intake just before bedtime (χ^2=19.62; p<0.05).

The strength of the relationship (Cramer's V) was 0.31 - the average strength of the relationship. There was a statistically significant relationship between age and frequency of meal intake after training or a match (χ^2=18.73; p<0.05). The strength of the relationship (Cramer's V) was 0.21 - weak strength of the relationship. No statistically significant differences were observed between age and the frequency of consumption of sweets and confectionery (χ^2=8.83; p=0.06), or between age and the frequency of consumption of salty snacks (χ^2=3.20; p=0.52).

Discussion

Optimal health and full exercise capabilities of football players are achieved by maintaining a calorie-appropriate, balanced, nutrient-rich diet. Young athletes should take care to meet their energy requirements and correct eating habits, which can protect them from inappropriate lifestyles in the future [20]. As interest in nutrition for athletes continues to grow, it is important to be aware that it can support the acquisition of energy during exercise, as well as support the resynthesis of energy substrates after the cessation of physical activity [21]. Nutrition should be adapted to training taking into account its duration, intensity and frequency. The higher rate of energy metabolism of working muscles raises the requirements for the amount of energy and nutrients supplied to the body. The caloric content of meals, as well as the distribution and quality composition, must cover energy losses caused by training [22]. Studies on the diet and eating habits of football players are needed to see if they are kept at an optimal level relative to meeting the needs arising from training and matches [23].

Our own study showed that the diet of football players (using the example of football players training in sports clubs in the Żywiec district) is qualitatively inadequate and fraught with erroneous eating habits. The results of our own study on the number of meals consumed showed that respondents most often chose to eat 4 meals (51%) in one day. A study by Kopeć, Nowacka, Klaji and Leszczynska on the frequency of intake of different food groups by athletes training football designated 5 meals as the correct way to distribute rations. Their results showed that the athletes studied usually consumed 3 or 4 meals per day, which according to the standard set in their study was not correct, but the results obtained there coincide with the results of our own study [21]. It can be assumed that regular consumption of well-balanced meals is crucial (4-6 small meals will help increase satiety and facilitate appetite control) [22].

Meal times should be tailored to the time when the game is played or training is conducted. Our own study showed that the majority of respondents met these recommendations, as up to 71% of them gave a response that said to eat meals 3-4 hours apart. In a study conducted by Korzeniowska, Ginter, Owczarek and Czarnecki, the results were very similar, as the majority maintained intervals of about 4 hours between meals [22]. The results regarding the number and intervals between meals should be accompanied by results relating to skipping breakfast and eating the last meal just before bedtime. Studies show that skipping breakfast can reduce endurance exercise performance. It can also underestimate daily carbohydrate intake, the adequate intake of which is crucial for those who want to perform at their best. One study found that a high-carbohydrate breakfast 3 h before physical activity increased exercise capacity by about 9% compared to those who skipped this meal [24]. A late dinner, on the other hand, can cause excessive strain on the gastrointestinal tract and, therefore, a lack of proper recovery [22].

An important part of assessing the nutrition of athletes is their peri-exercise nutrition, related to training and matches. It is important to consider their habits and habits that directly affect the exercise capacity they generate, and are able to improve or impair optimal recovery. The first behavior to pay attention to is the consumption of a meal and/or snack before, during, and after exercise. In a self-reported survey, only 32% of respondents admit that they always eat a meal before exercise. During exercise, as many as 80% of them never reach for a snack. After exercise, a meal is always consumed by 53% of football players. In a study by Elizondo et al. on the eating habits of adolescent football players from Mexico, pre- and post-training and match meals were consumed by 88% of players regardless of the time of day. Snack consumption during the training session was conditioned by the time of day. In the morning, 21% of players ate a snack, while in the afternoon it was 44% of them. The results are divergent, but more correct behavior is seen in a group of Mexican football players [25].

One of the questions in the in-house study asked about increasing fluid intake and consumption on a training and/or match day. Only 13% both eat and drink more. As many as 30% of athletes do not increase their

fluid and food supply, and 21% do not pay attention to the amount. A study by Briggs et al. of energy intake in professional teenage football players over the course of a week's worth of games showed that energy requirements were met only on the rest day. Training and match days generated an energy deficit, but the type of training had an impact on the size of the deficit (the largest for heavy training and matches) [23]. The study reports lead to the common conclusion that athletes do not take into account training and match day expenditure in their daily rations. These findings should be taken into account by the players themselves and by those responsible for the education of football players.

Another issue studied that affects the possible improvement of football players' diet and eating habits is the availability of a nutritionist and nutrition education at clubs. The results of the author's own study reported that 84% of clubs had never given their players the opportunity to receive consultation or dietetic care, and 83% of clubs had never organized any form of nutrition education. A study by other authors mentioned one case of running a nutrition education program at a club. Another program was based on 60% dietary control, with the rest of the food selected by the players in accordance with the researchers' general guidelines. It was also found that menu control is not a practical method of nutrition education [26]. A study by another author mentioned that only a few athletes had previously received dietary consultation (15%) [27]. Thus, it seems that attention to nutrition is being pushed to the sidelines, and clubs are not cooperating with nutritionists. This may be due to incurring too much cost in wanting such cooperation. There is not much research on the subject, so it would be worthwhile to elaborate on this issue to get the likely reasons.

The authors' own study examined the effect of training seniority and age on the consumption of certain foods and on certain eating behaviors. The first relationship that was tested was the effect of training seniority on the frequency of fish consumption. However, no correlation was found. Similar results were obtained for the consumption of white and red meat. In contrast, a study by Korzeniowska-Ginter et al. found that sports seniority significantly influenced the choice of meat type, reporting a correlation that the higher the seniority, the more likely athletes were to consume poultry meat as opposed to red meat [22]. In the case of fish, no relationship was found either. The discrepancy may be due to differences in the size of the study group, as well as the different divisions of the group by training seniority. These suppositions require confirmation in subsequent studies.

In our own study, we undertook an investigation of the relationship between training seniority and the frequency of vegetable and fruit consumption. Both showed statistically significant differences, although the strength of the correlation was not very high, so these observations should be approached with caution. In the case of fruits, it can be noted that younger athletes are more likely to reach for them often (42%), while older athletes consume them sometimes (63%). In vegetable consumption, the trend is similar. In a study by Kopeć, it was observed that sports level affected the frequency of fruit and vegetable consumption [21]. The results of these studies do not strictly overlap, so they should be confirmed in the future.

The current limitations of the in-house study may have affected the results regarding the relationships tested. The representativeness of the sample may not have been high enough for the results obtained to confirm the correlations tested. It would be worthwhile in future studies conducted on football players to take a wider group, albeit with appropriate age limits. Some of the questions might be worth further clarifying, or conducting two separate studies, one looking at consumption on weekdays and the other at consumption in relation to training and matches. Such a division could be more pertinent for amateur football players, who typically conduct training sessions twice a week. It would be worthwhile for future studies to address the issue of nutritional care in clubs to see if this area is overly neglected.

The survey has its limitations. In subsequent studies, it is worth increasing the representativeness of the sample to be able to confirm the studied correlations. It is worth paying more attention to individual age groups and the right number of people in different ranges. It is worth extending the study by comparing the eating habits of football players during training and weekdays. It could be more suitable for amateur athletes who usually train 2 times a week. It might not work for higher league players due to the greater number of training sessions and the related diet.

The questionnaire was prepared with due diligence and covered a large number of issues. This translated into a large number of questions and, consequently, the reluctance of the respondents to complete them. This should also be taken into account in future studies.

Conclusion

The diet of football players training in sports clubs in the Żywiec district is not adequate in terms of quality and erroneous eating habits are noticeable. Football players training in sports clubs in the Żywiec district do not meet the nutritional requirements for matches and training. This is evident, for example, in the lack of a meal especially after physical activity by a significant number of them. According to the study, training seniority and age are not the main factors influencing the quality of nutrition. Although some correlations were detected, they are not strong enough to establish a dominant relationship. Based on the results of our own research, it is important to lean into the aspect of the clubs' care for their athletes. The results showed that these issues are neglected both on the practical side (food, drinks) and the theoretical side (nutritionists, nutrition

education). It would be worthwhile to reflect on these insights and undertake future research focusing on similar topics.

The publication was funded by contract No. KNW-2-Z55/D/8/N

Conflicts of interest - The authors declare no conflict of interest.

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