

SOBEK, Olga & POLANIAK, Renata. The role of the dietitian in the nutrition of physically active people using a group of footballers as an example. *Journal of Education, Health and Sport*. 2023;13(1):31-37. eISSN 2391-8306. DOI <http://dx.doi.org/10.12775/JEHS.2023.13.01.004> <https://apcz.umk.pl/JEHS/article/view/40930> <https://zenodo.org/record/7352254>

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. Przynależność dyscypliny naukowej: Nauki o kulturze fizycznej (Dziedzina nauk medycznych i nauk o zdrowiu); Nauki o zdrowiu (Dziedzina nauk medycznych i nauk o zdrowiu). © The Authors 2022; This article is published with open access at License Open Journal Systems of Nicolaus Copernicus University in Torun, Poland Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author (s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non commercial license Share alike. (<http://creativecommons.org/licenses/by-nc-sa/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited. The authors declare that there is no conflict of interests regarding the publication of this paper. Received: 18.10.2022. Revised: 20.11.2022. Accepted: 22.11.2022.

The role of the dietitian in the nutrition of physically active people using a group of footballers as an example

Olga Sobek, Renata Polaniak

Department of Human Nutrition, Department of Dietetics ,Faculty of Health Sciences in Bytom, Medical University of Silesia in Katowice, POLAND, olga.sobek@sum.edu.pl

Abstract:

Introduction: Footballers often do not pay much attention to their diet. They get their knowledge about rational nutrition from various sources, most often from the internet. The person giving advice on nutrition is more often a coach than a professional nutritionist. Rational nutrition in combination with appropriate physical training allows for the desired sports results. Therefore, the role of a qualified nutritionist should be crucial.

Aims and objectives: The aim was to investigate the knowledge and dietary habits of high-performance football players and to demonstrate the consequences of not eating a well-balanced diet.

Material and methods: The study concerns a group of 100 people training football in sports clubs in the Silesian province. An original survey questionnaire was used to conduct them. Results were compiled using a Microsoft Excel spreadsheet.

Results: Only 12% of respondents receive regular professional advice from a dietician. Despite this, only 41% of respondents declare a willingness to take advice from a dietician.

Conclusions: The primary source of knowledge for football players is the internet and the coach. The unsatisfactory level of knowledge and poor eating habits are a consequence of the lack of care by a professional nutritionist in sports clubs.

Key Words: football, nutritional knowledge, eating habits, diet in sport.

Background

Dietetics is a rapidly growing scientific field with increasing relevance to everyday life [1]. Due to the increase in chronic non-communicable diseases (e.g. diabetes, hypertension, renal failure), the need for qualified nutritionists has increased. Healthy lifestyles have gained in popularity in recent years; moreover, society attaches greater importance to healthy eating than in the past [1,2].

The body's energy requirements depend on gender, weight, height, age, physiological state and physical activity. Depending on the sport, a person will burn a different amount of calories. Therefore, the energy requirements of athletes will depend on the sport they train in. During less intensive training, a volleyball or tennis player should provide the body with approximately 63.7 kcal/1 kg body weight. In contrast, the requirement of a football or handball player during less intensive training is 65 kcal/1kg body weight [3-7]. At an athlete's body weight of 75 kg, the difference in energy requirements between these sports is equal to 97.5 kcal. A person practising sports gymnastics or acrobatic gymnastics expends 60 kcal/kg body weight during a less intensive training period. Compared to a football player, the difference in energy expenditure is as much as 375 kcal/day [7].

Diet for those undertaking additional physical activity plays a key role. The higher the level of sophistication and professionalism, the more important the diet is to the athlete's performance. For professional athletes, a well-balanced diet is as important as the training of the body. It provides an easy and accessible way to regenerate the body. It is better and more effective than saunas and massages in rebuilding muscles damaged

during training or matches. Athletes also declare that the quality of nutrition improves their condition (physical as well as mental). Unfortunately, it is observed that the role of the nutritionist in the nutrition of athletes is neglected by them and coaches, despite the fact that diet determines such important aspects as those mentioned above [8,9]. Among athletes, the most popular source of nutritional information is the Internet, due to the ease of accessing information and the possibility of contacting and exchanging experience with other athletes. However, they are aware that not all information is reliable [8]. For nutritional advice, athletes who want to get reliable and state-of-the-art information should go to a nutrition specialist - a dietician [10,11].

For an athlete, rational nutrition should be very important and its principles strictly adhered to. Often, however, they do not have sufficient knowledge on the subject and, consequently, do not adhere to the appropriate dietary recommendations, which may consequently have an adverse effect on the body. [12]. Failure to follow a specific diet before exercise can cause heaviness and a feeling of fullness in the stomach, and this leads to a reduction in the body's performance during training. Also, depletion of glycogen and failure to provide sufficient carbohydrates to replenish in the muscles will lead to a significant decrease in body performance and feelings of fatigue and overtraining [13,14]. These factors can lead to injury. In addition, problems with motor coordination, loss of balance, and abnormal stride and running rhythms may occur. If carbohydrates are provided too late after intense exercise, the process of glycogen restoration and muscle regeneration will be delayed and feelings of fatigue and muscle soreness will be prolonged [13,14,15]. Insufficient protein will result in a deficit of essential amino acids. A negative nitrogen balance will cause damage to muscle cells, thus weakening the athlete's body [13]. Muscle catabolism can be the cause of slowed recovery after intense exercise, leading to muscle soreness and even injury. Insufficient milk supply can result in osteopenia and osteoporosis in the future [16]. Dehydration is also dangerous for the athlete's body, as it increases the work intensity of the heart and other organs, which can exacerbate the feeling of the level of difficulty of exercise and reduces the efficiency of the body, disrupting the acid-base and water-electrolyte balance [13,15]. Incorrect hydration- consuming too much fluid at once will also be detrimental to the body. Instead of optimal hydration, this condition will exacerbate diuresis. Incorrect supplementation (wrong doses) can lead to nutrient overdose with all its consequences [17]. The problems outlined above will result in the athlete not being able to perform to his or her potential, due to the poor functioning of his or her body. Therefore, it is worth taking care of a properly selected diet that will support the athlete's body during physical activity.

The aim of the study was to investigate the knowledge and its sources of competitive football players regarding their energy and macronutrient requirements.

Material and methods

The survey was conducted between January and March 2021. The survey involved 100 people - 25 women and 75 men between the ages of 18 and 35. The respondents were players practising the sport of football. Sixteen sports clubs located in Silesia were qualified for the study. The teams belonged to Class A, IV, III, II, I league and ekstraklasa. The study was conducted in accordance with the World Medical Association's Declaration of Helsinki. The study protocol was reviewed and approved by the Bioethics Committee of the Silesian Medical University in Katowice (PCN/0022/KB/68/I/20).

The survey was carried out using a self-administered survey questionnaire, consisting of 38 questions. The first part of the questionnaire consisted of a metric, whose questions allowed a general classification of the respondents. The second part of the questionnaire explored sources of information related to athlete nutrition and dietary adherence. The third part referred to the football players' nutritional habits and knowledge. 4 questions of the metric were open-ended questions, 34 questions were closed-ended of which 2 formed multiple choice questions and the rest were single choice. The multiple-choice questions related to the source of acquired knowledge on sports nutrition and the type of dietary supplements taken. Answers were given anonymously.

Inclusion criteria for the study were defined as: coaching football at the clubs included in the study, agreeing to participate in the study and being present at the consultation at which the study was conducted. Exclusion criteria for the study included: not speaking Polish at a communicative level.

Height measurements were taken immediately before completing the questionnaire. Height (cm) and body mass (kg) were measured to the nearest 0.1 cm (SECA 756, Seca gmbh & co. kg, Hamburg, Deutschland) and 0.1 kg (InBody 770, InBody USA, California, USA), respectively, with the respondent wearing underwear and no shoes. BMI (Body Mass Index) was calculated as body weight (kg) divided by height (m) squared. The results were used as the basis for assessing the height/body mass ratio with norms for the European population and WHO (World Health Organisation) recommendations.

The data obtained were processed using Statistica v.13.3 (Stat Soft Polska) and the R package v. 4.0.0 (2020) under the GNU GPL (The R Foundation for Statistical Computing).

For the presentation of quantitative data, mean values and standard deviations were calculated - $X \pm S$. For qualitative data, percentage notation was used. Qualitative data were expressed as numerical values determined by mathematical methods for statistical inference.

Results

A total of 100 respondents took part in the study, 25% of whom were female and the remaining 75% male. The mean age was 22.66 years with a standard deviation of 3.84, the median was 22. The youngest respondent was 18 years old and the oldest was 35 years old. The mean height was 177.83 cm with a standard deviation of 7.66. Body weight averaged 73.4kg (with a standard deviation of 9.64) and the median was 75kg. The lowest body weight recorded was 48kg, while the highest was 98kg. The lowest person measured 162cm and the highest 194cm. The largest number of respondents showed a normal BMI (80 people), with a smaller group being overweight (18) and underweight (2). The largest number of respondents (22) were men from the team HKS Odra Miasteczko Śląskie, followed by KS Carbo Gliwice, and the smallest number were players from GKS Jastrzębie Zdrój (1 person), KS Concordia Knurów (1 person), MKP Odra Centrum Wodzisław Śląski and MKS Śląsk Świętochłowice (1 person each). 51% of respondents had secondary education, the second largest group were respondents with tertiary education (23%).

The vast majority (85%) were respondents who had coached football for more than 4 years. The remaining 15% were respondents who had played 1-2 years and 3-4 years. No one chose the answer 'less than a year'. More than half (53%) also attended the gym outside of training. 13% coached individual sports and the rest (17% each respectively) coached other team sports or did not coach anything other than football. More than half (58%) of the respondents admitted that they train 2-3 times a week, followed by 28% who train 4-6 times a week, 7 or more times a week are attended by 14 players. No one trains once a week or less often. The training of a clear majority of the respondents (84%) lasts 1-2 hours, the rest of the people train 2-3 hours or more than 3 hours (8% each respectively). None train for less than one hour.

The most common source of knowledge chosen by respondents was the internet (82%), followed by a trainer (61%) and friends (57%). The answer 'nutritionist' was selected by 40 respondents. Only 4 people deepened their knowledge of sports nutrition through training and courses. As many as 46% of respondents have never taken advice from a dietician and only 12% attend regularly (at least once a month). Almost half (49%) of those coaching football do not follow a diet, with a high energy diet chosen by 40%. A diet was recommended by a dietician for 22% of footballers. The most common diet was not recommended (56%). More than ¾ of respondents declare to know their energy requirements, while half know what their nutrient requirements are. More than 1/3 of respondents do not calculate the calorific value of products and meals, and 42% do so approximately.

Of those surveyed, 62 said a high glycaemic index product or meal should be consumed before a workout, while only 14 athletes said low GI products. One-fifth admitted that they do not know which type of products are best to consume before training. As many as 62% of respondents said that a meal or product with a low glycaemic index should be eaten during training. Only 8% indicated the correct answer - high GI products. A satisfactory answer to the question about knowing what to eat after training was marked by 63%. In contrast, 16% said they did not know the answer.

Almost half of the respondents consume low-glycaemic-index products before physical activity, while as many as 31% do not eat a meal before training. Around ¼ consume high glycaemic index products during training, while 73% do not consume a snack. Nearly ¾ of those surveyed consume a mixed meal of protein and carbohydrates after training, with 15% admitting that they do not consume a meal after this physical activity. 41% of those surveyed believe that the last meal should be consumed 2-4 hours before exercise, however, such consumption is declared by only 26%. The majority of the athletes surveyed admit that they do not know what the correct amount of carbohydrate intake is during training, while 21% gave the correct answer. A satisfactory answer regarding the timing of a meal or snack after training was given by more than half of the athletes. More than ¾ of the respondents admit to drinking more than a litre of water during training, and the same amount is drunk during the day by almost all respondents (99%). Most of the respondents (40%) admitted that they sometimes (at least once a month) consume isotonic drinks, a comparable group of 31 consume these drinks during and/or after training, 28 do not.

Only 14% of respondents consume protein supplements when they have a workout, while more than half do not use these products. The majority of those surveyed do not use supplements (40%), while the most common choices among these are: creatine, protein supplements, glutamine, caffeine and beta-alanine. An overwhelming majority (81%) do not smoke cigarettes, while 55% of respondents admit to occasionally (at least once a month) consuming alcohol products, similarly fast food meals (57%).

Only 6% of respondents gave an incorrect answer regarding the benefits of a proper diet for an athlete, 4 people chose the answer "satisfaction", 2 chose body fatigue, while 4 people admitted that they did not know what benefits could be gained from a proper diet. 41% of the respondents express a strong desire to take professional advice from a nutritionist, while nearly ½ of the respondents have not thought about it or are not sure. Respondents rated their knowledge and eating habits as bad in 14 cases, sufficient in 36, similarly as good (34) and 16 football coaches consider them very good.

Discussion

Providing the body with an adequate amount of energy is associated with its normal development, and too little energy supply can lead to nutritional deficiencies, reduced physical performance and even deterioration in health [18,19]. A normal BMI value was recorded in 80% of the subjects. A slightly higher result was obtained in his work by R. Zarzeczny [20], while he claims that top-class football players achieve a result close to 23 [kg/m²]. However, this indicator does not give the percentage of body fat and muscle. Therefore, this index should not always be used to assess the nutritional status of athletes [21].

There are also irregularities in the adequate hydration of athletes. Fluid replenishment during training is declared by 88% of professional and 83% of amateurs, and after training by 95% and 92% respectively. More than 2.5 litres of water per day is drunk by 75% of professional athletes and 69% of amateurs [22]. Other scientific reports have shown that only 33% of swimmers surveyed replenish fluids during training and 38% do not do so at all. After training, the body hydrates 85% of them. A worrying fact is that 4% do not hydrate the body after exercise, and in half the amount of fluids provided is classified as the amount necessary for a non-training person [23]. Our own research has shown that 32% of subjects provide less than 1.5 litres of water during the day, and during training less than a litre of water is provided by as many as 43%. Isotonic sports drinks, which provide carbohydrates and valuable minerals and vitamins, are a good source of hydration. They were selected by 26.4% of respondents in a study by W. Kozirok [24] as the most frequently chosen beverage. Only still mineral water was chosen more frequently. Our own research showed that 40% of the football players surveyed use isotonic drinks at least once a week, 31% during and/or after training, and 28% do not use this type of sports drink. In contrast, B. Frączek [25] showed that the entire group of football players surveyed used isotonic drinks. Juniors training football in a study by M. Gacek [26] admitted that they drink isotonic drinks several times a week).

Often athletes working to improve their physique, increase muscle mass or develop strength turn to protein supplements. These vary in terms of rate of absorption, depending on the needs of the athlete's body. Protein sources include whey, casein, soya or eggs. Protein supplements have proven beneficial effects on the body - they stimulate skeletal muscle protein synthesis while inhibiting the breakdown of muscle proteins during and after exercise, and affect muscular endurance [9]. More than half of the respondents (53%) admitted that they do not use protein supplements, and only 14% on days when they have a workout. In a study by B. Frączek [25], one in three (32%) took these nutrients, including all athletes involved in cross-country skiing, short-course running and gymnastics. Similarly, a study of volleyball and basketball players found that 32% of those surveyed used sports nutrition, of which gainer (6.7%) and protein (6.2%) were the most common choices [27].

Creatine is a protein that occurs naturally in the human body. Its sources include meat, fish and dietary supplements. It is recognised as one of the best authorised anabolic agents and is recommended for athletes training in speed and strength disciplines (e.g. combat sports, weightlifting, short-distance running, bodybuilding and team games) [28]. It allows for longer sustained intense exercise and faster recovery between workouts, and helps to stimulate protein production and muscle growth [14,29]. This is why it is such an important supplement for professional athletes.

Our own research showed that creatine was the most popular supplement among the group of footballers surveyed, with 39% admitting that they include this protein in their dietary supplementation. In contrast, it was not as frequently used by the group of volleyball and basketball players. In a study by E. Szczepańska [27], only 9% supplemented creatine. A significantly higher percentage of those (58%) taking creatine was recorded in a study conducted by A. Szymanski [30], among young men who regularly exercise at the gym.

Another popular supplement is glutamine. It is an amino acid that can be synthesised in muscle cells from other amino acids. It is essential in the life cycle of all cells and is a valuable source of energy for the cells of the immune system. During intensive training or stress, its level in the blood drops, resulting in a lowering of immunity and an increased risk of disease. Glutamine levels then also drop in the muscles, resulting in a loss of muscle tissue. Supplement manufacturers claim that glutamine works by conserving protein as an energy source during intense training. However, it does not improve physical performance or body shape and does not aid recovery [14]. Therefore, it is important to consider whether additional glutamine supplementation is necessary, especially given that many protein supplements and meal replacement products contain it in their composition [14]. Nevertheless, our own research showed that it was the second most common supplement chosen by football players, with 23% of respondents reaching for it. As another study by B. Frączek [31], among young men undertaking recreational strength training, 14.9% of them supplement glutamine.

A common supplement used by respondents was caffeine. It has a stimulating effect and acts in a pharmacological way, so it is considered a stimulant and does not count as a nutrient. It stimulates the body and speeds up the heart rate [14,32]. A caffeine intake of 200-250 mg can improve mood and concentration. In terms of exercise, it helps: to increase the speed of tasks, improve motor coordination and reduce feelings of fatigue and drowsiness, thus increasing exercise tolerance [32,19,33]. In everyday life, caffeine is provided with coffee, tea or energy drinks and soft drinks such as Cola [32]. None of the group of professional athletes studied by B. Frączek [25] used caffeine as a dietary supplement. A different result was shown by a group of football players

in our study - 19% of the respondents supplemented this stimulant. The reason for the differences in the results of the compared studies cannot be stated unequivocally.

The use of stimulants (e.g. alcohol) by high-performance athletes is a worrying phenomenon. They have a negative impact on the human body by lowering performance, impairing cardiovascular fitness and can also lead to dehydration [22]. Nevertheless, our own research has shown that 22% of respondents consume alcohol at least once a week, the largest group (55%) are football players who drink alcohol at least once a month, and 23% declare that they do not consume alcohol. Research by K. Kaluzny [22] on the assessment and comparison of dietary behaviour in professional and amateur sport practitioners showed that 35% of professional and as many as 67% of amateurs consume alcohol several times a week. Junior football coaches in the study by M. Gacek [26] consumed alcoholic beverages the least frequently (less than several times a month). This is a disadvantageous result because the study group consisted of underage football players (aged 15-17 years).

Another aspect of poor nutrition is the frequency with which fast food is eaten. 16% of the football players surveyed admitted that they eat such meals more than once a week, more than once a month - 57% of the respondents, and only 28% of the respondents declared that they do not eat such meals. E. Szczepańska [27] showed that almost half (46%) of the surveyed athletes eat occasionally or not at all. A higher percentage (74.2%) was obtained by B. Frączek [34] among athletes practising team games at a high level. However, in the population studied by A. Lewandowska [35], meals of this type were consumed sporadically - women once a month and men 2-3 times a month. High sporting performance is not only due to the players on the pitch, but the result of the entire sporting team, which they form together with, among others, a coach, dietician, physiotherapist or psychologist. Often, athletes derive their knowledge of nutrition from the coach. However, research on their willingness to train in dietetics indicates that they consider this field to be the least interesting [36].

In our own research, the second most popular answer as a source of information on nutrition in sport is the coach. This was chosen by 61% of the football players surveyed. For those who practice running, the advice of a coach is relevant for 5% of women and men according to a study by M. Miśniakiewicz [8]. A study by T. Saidler [17] showed that the coach is the person influencing the decision to take supplementation in 64.1% of girls, and is also a source of knowledge on this subject for 71.8% of girls playing volleyball. Also among the physically active group, the decision to take supplementation was influenced by the coach's recommendations (72% of respondents) [11]. However, the most common source of information on proper nutrition in sport is the Internet. As shown by our own research, for as many as 82% of respondents it is the main source of knowledge. However, as shown by M. Miśniakiewicz [37] - 73% of men and 64% of women also indicated this answer. 51.4% of football players surveyed by T. Seidler [17] derived detailed knowledge on supplementation from the Internet. Friends were also found to be a frequent source of knowledge (29.7%). In our study, a higher percentage of this response was obtained - 57% of respondents. Far fewer people training in fitness clubs obtained their knowledge from friends - only 9% of women and 5% of men [60]. The best source of information on proper nutrition is a dietician. Unfortunately, they are not the main, let alone the only, source of knowledge for athletes. Only 11% of female and 6% of male runners take his advice [8]. Another study among football players showed that he was chosen by 8.1% of respondents as a source of information about supplements [17]. In contrast, the decision to take supplements by physically active people was consulted by a doctor or nutritionist by only 4% of respondents [11]. Our own research on a group of football players showed that only 12% of the respondents regularly (at least once a month) use the advice of a dietician, while at least twice a year or once was used by 42% of the respondents. A dietician as a source of information was indicated by 40% of the respondents.

It is worrying that so few footballers take advice from a professional nutritionist. His or her role in the nutrition of athletes is very important, as a properly selected diet is a key aspect in achieving sporting success. It is therefore necessary to promote the beneficial effects of rational nutrition, and thus the work and role of the dietician with the patient as well as the athlete.

Conclusions

Based on the study, it was shown that the knowledge and nutritional habits of professional football players are at a low level. Despite the low level of nutritional knowledge, good nutritional habits are present in the majority of the football players surveyed. The nutritional knowledge of the respondents is at a very low level. Footballers do not know what type of meal they should consume before and during training. Half of the respondents are aware of their low level of knowledge. There is a need for nutritional education among footballers. The respondents' primary source of knowledge regarding nutrition in sport is the Internet and the coach. They do not take advice from a dietician, but express a willingness to use their services. Respondents know the benefits of rational nutrition in sport, however, they require education on the consequences of not following an athlete's diet.

The footballers interviewed train at clubs that do not employ a club dietician, making it difficult to access dietary advice. There is a private cost involved in engaging with a professional nutritionist. The research should be extended to more professional clubs to compare results and see if there is a correlation between the

level of knowledge and league level of football teams.

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

References:

1. Całyniuk, B. (2014). Miejsce pracy dietetyka, *Piel. Zdr. Publ*, 4, 285-292.
2. Projekt Ustawy o niektórych zawodach medycznych, Warszawa, 2008.
3. Jaworski, M., Klimkowska, K., Różańska, K., Fabisiak A. (2017). Rehabilitacja żywieniowa w jadłowstręciu psychicznym: rola i zakres pracy dietetyka w zespole terapeutycznym. *Medycyna Ogólna i Nauki o Zdrowiu*, 2, 122-128. DOI: <https://doi.org/10.26444/monz/75337>
4. Róg, J., Krakula-Juchnowicz, H. (2017). Rola dietetyka w opiece nad pacjentem z zaburzeniami psychicznymi. *Psychoterapia i Uzależnienia*, 2, 1-8.
5. Krotki, M. A. (2015). Rola dietetyka w opiece nad chorymi poddawanych operacjom bariatrycznym, *Postępy Nauk Medycznych*, 9, 667-672.
6. Podgórska, Paśnik K. (2014). Rola dietetyka w prowadzeniu chorego leczonego bariatrycznie, *Piel. Zdr. Publ*, 4, 277-283.
7. Muchacka, R., Cebula, N. (2017). „Nadwaga i otyłość - ogólnoswiatowa epidemia,” *Prace Naukowe WSZIP*, 42, 75-85.
8. Heaney, S., O'Connor, H., Michael, S., Gifford, J., Naughton, G. (2011). *Nutrition knowledge in athletes*. A systematic review. *Int J Sport Nutr Exerc Metab*, 21, pp. 248–261
9. Mizera, J., Mizera K. (2017). *Dietetyka Sportowa*, Łódź: Galaktyka.
10. Sawka, M.N., Burke, L.M., Eichner, E.R., et al. (2007). *American College of Sports Medicine position stand. Exercise and Fluid Replacement*. *Medicine and Science in Sports and Exercise*, 39 (2), pp. 377-390.
11. Krejpcio, Z., Skwarek, K., Hyżyk, A., Dyba, S. (2011). Ocena powszechności spożycia suplementów diety w wybranej grupie osób aktywnych sportowo. *Probl Hig Epidemiol*, 4, 935-938. <http://dx.doi.org/10.17306/J.INTERCATHEDRA.2019.00080>
12. Ostachowska-Gąsior, A., Krzeszowska-Rosiek, T., Górka S. (2014). Ocena wiedzy żywieniowej osób o wysokiej aktywności fizycznej uczęszczających do klubów fitness. *Probl Hig Epidemiol*, 95, 969-974, 2014.
13. Zając, A. i wsp. (2014). *Żywność i Suplementacja w Sporcie, Rekreacji i Stanach Chorobowych*. Katowice, Wydawnictwo Akademii Wychowania Fizycznego im. Jerzego Kukuczki w Katowicach
14. Bean, A. (2017). *The Complete Guide to Sports Nutrition*. London: Bloomsbury Pub.
15. Mizera K., Mizera, J. (2012). Dieta piłkarska. Nawadnianie, *Sport wyczynowy*, 543, 71-86.
16. Dymowska-Malesa, M., Walczak, Z. (2011). Suplementacja w sporcie, *Nowiny Lekarskie*, 80, 199-204.
17. Seidler, T., Sobczak, A. (2012). Suplementy diety w żywieniu uczniów Szkoły Mistrzostwa Sportowego, *Rocz Panstw Zakł Hig*, 2, 193-198.
18. Całyniuk, B., Fibich, K., Kulik-Kupka, K., Zołoteńka-Synowiec, M., Malczyk, E. (2015). Wzory żywieniowe chłopców trenujących w Akademii Piłki Nożnej – energia i składniki odżywcze, *Nowa Pediatria*, 2, 62-67.
19. Bieńczyk, G. (2013). Specyfika żywienia, żywności i napojów w sporcie, rekreacji i turystyce, *Zeszyty Naukowe. Turystyka i Rekreacja*, 12, 105-123.
20. Zarzeczny, R. i wsp. (2007). Wydolność fizyczna I-ligowych piłkarzy nożnych w różnych okresach treningowych, *Medycyna Sportowa*, 6, 95-98.
21. Ciborowska, H., Rudnicka, A. (2014). *Dietetyka. Żywność zdrowego i chorego człowieka*. Warszawa: PZWL.
22. Kałużny, K. i wsp. (2016). Ocena oraz porównanie zachowań żywieniowych u osób uprawiających sport zawodowo i amatorski, *Journal of Education, Health and Sport*, 2, 301-310.
23. Zabrocki, R., Kaczyński, R. (2012). Ocena zachowań żywieniowych Młodzieży uprawiającej sporty wysiłkowe, na przykładzie pływania, *Bromat. Chem. Toksykol*, 3, 729-732.
24. Kozirok, W., Babicz-Zielińska, E. (2013). Ocena spożycia wody i napojów przez zawodników różnych dyscyplin sportowych, *Probl Hig Epidemiol*, 94, 262-265.
25. Frączek, B., Gacek, M., Grzelak, A. (2012). Żywieniowe wspomaganie zdolności wysiłkowych w grupie sportowców wyczynowych, *Probl Hig Epidemiol*, 4, 817-823.
26. Gacek, M. (2013). Spożycie napojów w grupie juniorów młodszych trenujących piłkę nożną – niektóre uwarunkowania osobnicze, *Probl Hig Epidemiol*, 2, 286-290.
27. Szczepańska, E., Spałkowska, A. (2012). Zachowania żywieniowe sportowców wyczynowo uprawiających siatkówkę i koszykówkę, *Rocz Panstw Zakł Hig*, 4, 483-489.
28. Nastaj M. (2012). Wpływ suplementacji monohydratem Kreatyny diety mężczyzn uprawiających

sporty siłowe. *Bromat. Chem. Toksykol*, 45, 936-942.

29. Biela, B., Zagrodzki, P. (2013). Ocena opieki żywieniowej u zawodników wyczynowo uprawiających skoki narciarskie i kombinację norweską, *Probl Hig Epidemiol*, 2, 291-293.

30. Szymański, A., Wiszniewski, R. (2017). Wiedza żywieniowa a ocena jakości żywienia młodych mężczyzn regularnie ćwiczących na siłowni, *Aktywność Fizyczna i Zdrowie*, 12, 39-45.

31. Frączek, B., Grzelak, A. (2012). Suplementacja kreatyną w grupie młodych mężczyzn podejmujących rekreacyjnie trening siłowy, *Probl Hig Epidemiol*, 1, 425-431.

32. Bojarowicz, H., Przygoda, M. (2012); Kofeina Cz. I. Powszechność stosowania kofeiny oraz jej działanie na organizm, *Probl Hig Epidemiol*, 98, 8-13.

33. Giesbrecht, T., Roycroft, J.A., Rowson, M.J. (2010). The combination of L-theanine and caffeine improves cognitive performance and increases subjective alertness, *Nutr Neurosci*, 6, 283-290.

34. Frączek, B., Brzozowska, E., Morawska, M. (2013). Ocena zachowań żywieniowych zawodników trenujących gry zespołowe w świetle rekomendacji piramidy żywieniowej dla sportowców, *Probl Hig Epidemiol*, 2, 280-285.

35. Skop-Lewandowska, A., Małek, A., Gm.r M., Kolarzyk, E. (2013). Sposób żywienia oraz popularność stosowania suplementów diety i odżywek wśród młodych osób uczęszczających do klubów fitness, *Probl Hig Epidemiol*, 4, 786-793.

36. Stosik, A., Seweryniak, T. (2014). Diagnoza procesu zwiększania efektywności zespołów sportowych w aspekcie podmiotów wspierających wiedzę specjalistyczną trenerów, *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 349, 372-388.

37. Miśniakiewicz, M., Hebda, B. (2014). Znaczenie racjonalnego żywienia w optymalizacji jakości życia osób rekreacyjnie uprawiających bieganie, *Przedsiębiorstwo we współczesnej gospodarce - teoria i praktyka*, 4, 31-42.