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Original article

# A research on the evaluation of nutrition knowledge levels of soccer coaches

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**Abstract.** *Study Objectives:* The study aimed to compare the nutritional knowledge levels of soccer coaches according to their educational status, different league levels, and job variables. *Methods:* A total of 240 coaches, including technical directors (n = 73), assistant coaches (n = 74), goalkeeper coaches (n = 43), performance specialists / analysts (n = 50) participated in the study voluntarily. Nutritional knowledge of soccer coaches was determined by "The Nutrition for Sport Knowledge Questionnaire" (NSKQ). One-Way ANOVA test was used to determine the difference between the groups, and the Scheffe test, one of the Post-hoc tests, to determine which group the difference was originated from. *Results:* As a result of the statistical analysis, while there was no significant difference between the nutrition knowledge total scores of soccer coaches and both the league level and job description, performance specialists/analysts had higher scores in the job description variable. It was determined that sports science and university graduate coaches had higher total score values with their weight control, sports nutrition, and alcohol sub-dimensions compared to high school and undergraduate coaches ($p < 0.05$). *Conclusion:* As a conclusion, it is vital to apply correct loading and nutrition strategies to protect the overall health of soccer players and increase their performance efficiency. However, it has been determined that the information on sports nutrition of the trainers who organize the nutrition programs in the lower leagues is low. It can be suggested that soccer coaches should increase their awareness about sports nutrition and follow up-to-date nutrition knowledge for their professional development.

**Key words**: Soccer, sports nutrition, soccer coach

## Introduction

Sports nutrition is a specialty that occurs with the interaction of exercise and nutrition sciences. In addition to maintaining health and performance in sports nutrition (1), it is aimed to reach and maintain the body composition specific to the sports branch, to provide functions such as recovery after exercise and body fluid balance (2). Adequate and balanced nutrition is very important in achieving optimum body function and composition in athletes (3). The energy requirements of athletes differ according to the duration and intensity of the exercise in daily and annual training plans (4). It is known that the nutritional time and meal contents of athletes help increase their training and competition performances. For this reason, athletes need to develop nutritional strategies to improve both physical and mental performance before, during, and after exercise. (5). In addition, correct hydration, adequate energy, and macro and micro-nutrients in athletes achieve the performance target, as well as an increase in training adaptation and a decrease in disease and injury risks (6).

Athletes must adopt nutritional techniques that improve their performance before and after exercise. A certain level of nutritional knowledge is required to apply these techniques. Low nutritional knowledge is considered to harm on food intake and performance in athletes (7). In a study conducted by Kolodinsky et al. (2007), it was found that in athletes with low nutri-

tional knowledge, fat and sugar consumption and energy intake were high and nutrient intake was low (8). In a similar study, it was found that athletes with low nutritional knowledge levels were not aware of current nutritional recommendations and their carbohydrate consumption was insufficient (9,10). In addition, it has been stated that athletes do not have sufficient information about the use of food supplements and doping, which can adversely affect health (11).

It is known that both amateur and professional soccer players in the soccer branch have inadequate nutritional knowledge and have problems with branch-specific nutrition (12,13). In addition, it was determined in different study results that athletes preferred their trainers as the main source of knowledge rather than a specialist in nutrition (14,15). Therefore, the nutritional knowledge level of coach, strength and conditioning specialist, and other support team members is very important for a high performance in athletes (16).

In the absence of a specialist in the field of nutrition in several teams with limited opportunities in the soccer branch, it is considered that the nutritional knowledge levels of the trainers are important for the athletes to be fed in an adequate and balanced manner. In the literature, studies are investigating the nutritional knowledge level of athletes and coaches (17,18). However, a study comparing the athlete's nutrition knowledge levels of the trainers according to their educational status, different leagues, and job descriptions have not been found. Therefore, the current study aimed to compare the nutritional knowledge levels of soccer coaches according to their educational status, different league levels, and job variables.

## Methods

### *Participants*

A total of 240 coaches, including technical directors (n = 73), assistant coaches (n = 74), goalkeeper coaches (n = 43), performance specialists/analysts (n = 50) working in the professional and amateur football teams voluntarily participated in the study. The mean age of the participants was 40.57 ± 8.92 years and the mean working duration of coaches was 12.09 ± 6.42 years.

### *Experimental Design*

The scale used in the study is used in the evaluation of the nutritional information of adult athletes developed by Trakman et al (2017), whose original name is "The Nutrition for Sport Knowledge Questionnaire" (NSKQ), (19). The Nutrition for Sport Knowledge Questionnaire (NSKQ) was adapted into Turkish by Çırak and Çakıroğlu in 2019 and its both validity and reliability were determined. The validity and reliability levels of the study were determined as (α = 0,908). According to the results of the evaluation, 68 items are included in the NSKQ. The scale also includes 6 subdimensions related to weight management (3 items), macronutrients (22 items), micronutrients (12 items), sports nutrition (11 items), supplements (11 items), and alcohol (9 items). The items of the scale are composed of multiple choice and 3-likert type (20).

As a result of the research, knowledge scores are calculated based on the correct responses and overall performance (68 items 100 points; "weak" knowledge (0-49%), "average" knowledge (50-65%), "good" knowledge on the Sports Nutrition Information Scale (NSKQ) (66-75%) and "excellent" knowledge (75-100%) are evaluated using means of the scoring system).

### *Statistical Analysis*

Data analysis was conducted through SPSS 24 program. One-Way ANOVA test was used to determine the difference between the groups and Scheffe test, one of the post-hoc tests, was used to determine from which group the difference was originated from. The relationship between the ages of the coaches and their nutritional knowledge levels was determined by Pearson Correlation Analysis. In the study, the level of significance was accepted as $p < 0.05$.

## Results

According to Table 1, there was a significant difference between high school and under school graduates,

the faculty of sports science graduates and university graduates in the weight management sub-dimension. It is seen that there was significant difference, which is in favor of coaches who are graduates of the faculty of sports sciences and university graduates. In addition, there was a significant difference between high school and undergraduates and the faculty of sports science graduates in the sub-dimensions of sport nutrition, alcohol, and total score. It was determined that there was a significant difference, which is in favor of coaches graduating from the faculty of sports sciences ($p < 0.05$).

According to Table 2, there was a significant difference between the technical directors and performance specialists/analysts. It was determined that there was a significant difference, which is in favor of performance specialists/analysts in weight management and sports nutrition sub-dimension. In addition, it was found that there was a difference between the assistant coaches and goalkeeper coaches in favor of goalkeeper coaches in the alcohol sub-dimension.

When Table 3 is examined, it was determined that there was a significant difference between the coaches working in the Super League and the coaches working in the TFF 1st League in favor of the coaches working in the Super League ($p < 0.05$).

When the table 4 is examined, it is clear that as the ages of the coaches increase, the scores received from the supplement sub-dimensions and weight management sub-dimensions decrease ($p < 0.05$).

## Discussion and Conclusion

This study was conducted to compare soccer coaches' sports nutrition knowledge levels according to their education level, league level, and job descrip-

**Table 1**. Comparison of nutritional knowledge levels according to coach's educational status

| | Education status | N | Mean ± S.D. | F | p |
|---|---|---|---|---|---|
| Weight management | High School and under | 39 | ,56 ± ,86[b] | 11,02 | ,00* |
| | Faculty of Sports Science | 144 | 1,63 ± 1,30[a] | | |
| | University | 57 | 1,44 ± 1,37[a] | | |
| Macronutrients | High School and under | 39 | 12,59 ± 5,62 | ,74 | ,47 |
| | Faculty of Sports Science | 144 | 13,31 ± 4,25 | | |
| | University | 57 | 12,59 ± 4,29 | | |
| Sports nutrition | High School and under | 39 | 6,86 ± 3,34[b] | 4,11 | ,01* |
| | Faculty of Sports Science | 144 | 8,56 ± 3,38[a] | | |
| | University | 57 | 7,99 ± 3,16[ab] | | |
| Supplement | High School and under | 39 | 4,33 ± 2,15 | 1,65 | ,19 |
| | Faculty of Sports Science | 144 | 5,10 ± 2,24 | | |
| | University | 57 | 5,03 ± 2,77 | | |
| Alcohol | High School and under | 39 | 4,97 ± 3,01[b] | 5,94 | ,00* |
| | Faculty of Sports Science | 144 | 6,64 ± 2,63[a] | | |
| | University | 57 | 5,93 ± 2,94[ab] | | |
| Micronutrients | High School and under | 39 | 7,54 ± 2,96 | ,40 | ,67 |
| | Faculty of Sports Science | 144 | 7,74 ± 2,65 | | |
| | University | 57 | 7,37 ± 2,46 | | |
| Total Score | High School and under | 39 | 36,87 ± 11,88[b] | 5,52 | ,00* |
| | Faculty of Sports Science | 144 | 43,01 ± 10,12[a] | | |
| | University | 57 | 40,37 ± 10,72[ab] | | |

*p < 0,05; S.D.: Standart Deviation; a, b: Different letters represent the difference between groups.

**Table 2.** Comparison of nutritional knowledge levels according to coaches' job status

| | Job Descriptions | N | Mean ± S.D | F | p |
|---|---|---|---|---|---|
| Weight management | Technical Directors | 73 | 1,16 ± 1,17[b] | 3,69 | ,01* |
| | Assistant Coaches | 74 | 1,49 ± 1,42[ab] | | |
| | Goalkeeper coach | 43 | 1,16 ± 1,30[ab] | | |
| | Performance Specialists/Analysts | 50 | 1,88 ± 1,22[a] | | |
| Macronutrients | Technical Directors | 73 | 12,89 ± 4,72 | ,04 | ,98 |
| | Assistant Coaches | 74 | 13,15 ± 4,98 | | |
| | Goalkeeper coach | 43 | 13,06 ± 3,88 | | |
| | Performance Specialists/Analysts | 50 | 13,00 ± 4,03 | | |
| Sports nutrition | Technical Directors | 73 | 7,55 ± 2,85[b] | 2,83 | ,03* |
| | Assistant Coaches | 74 | 7,94 ± 3,02[ab] | | |
| | Goalkeeper coach | 43 | 8,20 ± 3,04[ab] | | |
| | Performance Specialists/Analysts | 50 | 9,29 ± 4,46[a] | | |
| Supplement | Technical Directors | 73 | 4,75 ± 2,29 | 1,80 | ,14 |
| | Assistant Coaches | 74 | 4,98 ± 2,50 | | |
| | Goalkeeper coach | 43 | 4,54 ± 1,72 | | |
| | Performance Specialists/Analysts | 50 | 5,58 ± 2,69 | | |
| Alcohol | Technical Directors | 73 | 5,68 ± 2,67[ab] | 4,93 | ,00* |
| | Assistant Coaches | 74 | 5,64 ± 2,63[b] | | |
| | Goalkeeper coach | 43 | 7,11 ± 1,92[a] | | |
| | Performance Specialists/Analysts | 50 | 7,02 ± 2,91[ab] | | |
| Micronutrients | Technical Directors | 73 | 7,89 ± 2,59 | ,38 | ,75 |
| | Assistant Coaches | 74 | 7,53 ± 2,71 | | |
| | Goalkeeper coach | 43 | 7,52 ± 2,28 | | |
| | Performance Specialists/Analysts | 50 | 7,44 ± 3,00 | | |
| Total Score | Technical Directors | 73 | 39,94 ± 10,28 | 1,70 | ,16 |
| | Assistant Coaches | 74 | 40,75 ± 10,27 | | |
| | Goalkeeper coach | 43 | 41,62 ± 10,05 | | |
| | Performance Specialists/Analysts | 50 | 44,23 ± 12,39 | | |

*p < 0,05; S.D.: Standart Deviation; a, b: Different letters represent the difference between groups.

tion variables. According to the results of the study, although there is no significant difference between the nutritional knowledge levels of the soccer coaches and the level of the league in which they work, it is determined that the total score of the athlete nutrition knowledge of all coaches working in different leagues is in the weak category. The reason for this result may be since all candidates have participated in a common training program in soccer coaching courses. Therefore, this can be explained by the fact that soccer coaches receive the coaching certificate at the end of a common training process, regardless of amateur or professional league separation. In addition to field practices such as technical and tactical, soccer coaches' opinions and suggestions on sports health and nutrition are thought to effect on athletes' eating habits. In addition, the absence of a nutritionist, especially in teams at lower league levels, is a factor that increases the responsibility of coaches in the nutrition of athletes. For this reason, a low level of nutritional knowledge determined

**Table 3.** Comparison of nutritional knowledge levels according to the league categories of coaches

| | League Category | N | Mean ± S.D. | F | p |
|---|---|---|---|---|---|
| Weight management | Super League | 36 | 1,96 ± 1,40[a] | 3,29 | ,00* |
| | TFF 1. League | 41 | ,93 ± 1,33[b] | | |
| | TFF 2. League | 48 | 1,34 ± 1,20[ab] | | |
| | TFF 3. League | 40 | 1,32 ± 1,09[ab] | | |
| | Local Amateur League | 39 | 1,77 ± 1,39[ab] | | |
| | Amateur League | 36 | 1,22 ± 1,19[ab] | | |
| Macronutrients | Super League | 36 | 13,43 ± 4,98 | ,60 | ,69 |
| | TFF 1. League | 41 | 13,05 ± 4,48 | | |
| | TFF 2. League | 48 | 12,62 ± 4,33 | | |
| | TFF 3. League | 40 | 12,24 ± 4,60 | | |
| | Local Amateur League | 39 | 13,19 ± 4,08 | | |
| | Amateur League | 36 | 13,80 ± 4,69 | | |
| Sports nutrition | Super League | 36 | 8,41 ± 3,56 | 1,14 | ,34 |
| | TFF 1. League | 41 | 8,71 ± 3,84 | | |
| | TFF 2. League | 48 | 7,65 ± 3,73 | | |
| | TFF 3. League | 40 | 7,57 ± 2,98 | | |
| | Local Amateur League | 39 | 8,86 ± 2,98 | | |
| | Amateur League | 36 | 7,80 ± 2,78 | | |
| Supplement | Super League | 36 | 4,53 ± 2,36 | ,41 | ,84 |
| | TFF 1. League | 41 | 4,98 ± 2,86 | | |
| | TFF 2. League | 48 | 5,26 ± 2,05 | | |
| | TFF 3. League | 40 | 5,00 ± 1,96 | | |
| | Local Amateur League | 39 | 5,01 ± 2,62 | | |
| | Amateur League | 36 | 4,86 ± 2,37 | | |
| Alcohol | Super League | 36 | 6,53 ± 2,75 | ,83 | ,52 |
| | TFF 1. League | 41 | 6,63 ± 2,48 | | |
| | TFF 2. League | 48 | 5,88 ± 2,78 | | |
| | TFF 3. League | 40 | 6,25 ± 2,95 | | |
| | Local Amateur League | 39 | 6,41 ± 2,98 | | |
| | Amateur League | 36 | 5,55 ± 3,02 | | |
| Micronutrients | Super League | 36 | 7,47 ± 2,99 | ,57 | ,71 |
| | TFF 1. League | 41 | 8,21 ± 2,34 | | |
| | TFF 2. League | 48 | 7,59 ± 2,71 | | |
| | TFF 3. League | 40 | 7,31 ± 2,43 | | |
| | Local Amateur League | 39 | 7,42 ± 2,90 | | |
| | Amateur League | 36 | 7,67 ± 2,56 | | |
| Total Score | Super League | 36 | 42,36 ± 12,25 | ,53 | ,73 |
| | TFF 1. League | 41 | 42,53 ± 10, 06 | | |
| | TFF 2. League | 48 | 40,37 ± 9,61 | | |
| | TFF 3. League | 40 | 39,7 ± 11,31 | | |
| | Local Amateur League | 39 | 42,68 ± 11,60 | | |
| | Amateur League | 36 | 40,93 ± 10,14 | | |

*p < 0,05; S.D.: Standart Deviation; a, b: Different letters represent the difference between groups.

**Table 4**. Relationship between age and nutritional knowledge

| | | Alcohol | Supplement | Sports nutrition | Macro-nutrients | Weight management | Micro- nutrients | Total Score |
|---|---|---|---|---|---|---|---|---|
| | r | ,02 | -,15* | ,02 | ,06 | -,31** | ,85 | -,01 |
| Age | p | ,73 | ,01 | ,74 | ,32 | ,00 | ,18 | ,84 |
| | N | 240 | 240 | 240 | 240 | 240 | 240 | 240 |

*p < 0,05

by coaches working in the league variable may lead to the misleading of athletes regarding nutrition. In several studies conducted in the literature, although athletes showed their trainers as the main source of knowledge, it was found that the trainers' nutritional knowledge level was low (14,18,21).

As a result of the comparison between the coaches' sports nutrition knowledge levels and the job descriptions of coaches, it was determined that despite a significant difference the technical directors and performance specialists/analysts had, the total score averages of all coaches were weak in the job description variable. The significant difference determined in sports nutrition and weight control sub-dimensions was in favor of performance specialists/analysts. In soccer, the field of performance specialists/analysts are regarded as relatively new coaching. Therefore, the nutrition knowledge of performance specialists/analysts is considered to be more up-to-date than the technical directors. Soccer coaches are free to participate in a development seminar or an informative training activity for sports nutrition after receiving the coaching certificate. Therefore, the significance determined in favor of the performance specialists/analysts coaches can be explained by the fact that the knowledge of the coaches regarding the sports nutrition is not up to date. In addition, performance specialists/analysts are generally graduates of sports sciences, and their nutritional knowledge levels are considered to be partially higher due to taking nutritional courses as part of formal education. In the study of Torres-McGehee et al (2012) on coaches, the fact that athletic trainers stated that their nutritional knowledge scores were higher than the technical directors supports the results of the current study (17). On the other hand, due to the limited opportunities in soccer, especially in the lower league teams, there is no nutritionist or even performance specialists/analysts in the technical team. In this case, the nutrition planning of the teams is conducted by the technical directors. Even if a coach with a low nutritional knowledge level applies correct loading and rest strategies to his athletes, it is thought that athletes who lack a sufficient and balanced nutrition program will experience performance losses. To achieve a high performance in sports, balanced, regular, and purposeful nutrition is required in addition to protecting the health of an athlete. In different studies conducted in the literature, it was stated that malnutrition negatively affects training and match success in athletes (22,23). Therefore, regardless of the job descriptions of soccer coaches, sufficient nutritional knowledge is required to increase the efficiency of the training and to achieve high performance.

In the current study, according to the results of the evaluation between soccer coaches level of sports nutrition and their educational status, it was determined that sports science and university graduate coaches, weight control, sports nutrition and alcohol sub-dimensions and total score values were higher than the high school and undergraduate coaches. However, it was determined that the sub-dimensions and total scores of NSKQ were weak according to the educational status variable of all coaches. It is thought that this result may stem from some reasons. The coaches who completed his high school and lower level education completes the sports nutrition course with an accelerated program in a short period in the coaching course they attended. On the other hand, students must be successful in the exams held by participating in the course for 14 weeks in the sports nutrition course included in the sports science education program at universities. Therefore, the significant difference in favor of soccer coaches graduating from sports nutrition and alcohol sub-dimensions and the total score of sports

science is expected since the sports nutrition course taken within the scope of formal education. Trakman et al. (2017) stated that there was a significant difference in favor of athletes who took nutritional education as a result of the comparison of nutritional knowledge scores of athletes who took nutritional education and those who did not (19). Şanlıer et al. (2017), in a similar study, it was found that the average score of students who took a nutritional course was higher as a result of the comparison of the nutritional knowledge of the students who took basic nutrition courses in the health sciences and those studying in other departments (24). The above-mentioned studies confirm the results obtained in the current study as individuals who take a nutritional course indicate that their nutritional knowledge level is higher.

As a result of the study, a significant negative correlation was determined between the knowledge level of the soccer coaches' sports nutrition and the age variable. In other words, as the age of the coaches increased, it was determined that there was a decrease in the scores of the supplement and weight control subdimensions. As in all areas of sports, scientific studies on sports nutrition are increasing rapidly. Along with the increase in the number of studies on sports nutrition, existing knowledge may change as well as new knowledge is added to the literature. Therefore, as the ages of the coaches increase, it is thought that the knowledge about the supplement and weight control sub-dimensions is since the current studies are not followed sufficiently. In addition, the fact that the new generation can access a good amount of knowledge easily and quickly using the internet tools more effectively may be the reason for the increase in the nutritional knowledge level of young coaches. The absence of a study in the literature evaluating soccer coaches by age variable can be considered as the originality of the current study.

In conclusion, athletes' nutrition, along with other factors, is vital for maintaining their overall health and improving performance. Correct loading and proper nutrition strategies are required to increase efficiency as a result of the exercises applied to athletes. However, although the level of knowledge of the nutrition of coaches graduating from the field of sports science is partially higher, it is noteworthy that it is very low when evaluated according to the sub-dimensions and total scores of the NSKQ. It is essential to keep the nutrition of the athletes at the forefront in the training courses of the soccer federation. Moreover, it may be recommended that there should be an increase in the number of nutrition courses in the Faculty of Sport Sciences which train and educate the coaches of tomorrow and to follow the current nutrition knowledge for their professional development.

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