

INVESTIGATION OF NUTRITIONAL KNOWLEDGE LEVELS OF FACULTY OF SPORTS SCIENCE STUDENTS

**Mihriay Musa*, Senol Yanar,
Abdurrahman Kepoglu, Ilker Gunel**

*Usak University, Faculty of Sport Sciences, Usak, **TURKEY***

*Corresponding author: mihriay.musa@usak.edu.tr

ABSTRACT

This research aims to investigate the nutritional knowledge levels of students studying in the sports science faculty of the university. To ensure healthy growth and development of people, balanced nutrition is very important as well as adequate nutrition. The nutrients and energy needed by the body are affected by various variables such as age and gender. Also, having enough and quality of nutrients in the body has an important effect in terms of health. Athletes, on the other hand, need to pay more attention to nutrition beside health. It is possible that the physical performance is at a sufficient level and that this performance can continue, by paying attention to the nutrition of the athlete. Adequate nutritional knowledge of instructors and trainers who train athletes and athletes provides a positive effect on the performance of the athlete he educates. In the study, a questionnaire consisting of two parts was applied to collect data to apply to sports science students. Determining "the Demographic Features of the Participants" in the first part of the questionnaire (17 questions); and in the second part, the questions to determine "Sports Nutrition and Nutritional Knowledge Levels" (18 questions) are included. Validity and reliability studies of the applied questionnaire were carried out. A questionnaire measuring nutritional knowledge levels was applied to the sample individuals who participated in the study before and after nutrition education by the expert in the field of nutrition. There is a significant difference between the nutritional knowledge levels of individuals after receiving nutritional education and the nutritional knowledge levels before receiving nutritional education. Accordingly, nutrition education given to individuals has increased their nutritional knowledge level.

Keywords: Sports, Sports Sciences, Student, Education, Nutrition

INTRODUCTION

Regular nutrition is one of the main factors in humanity's sustainability healthily. For this reason, people have focused on the concept of nutrition since the early ages. Today, as well as the basic nutrition, due to the change of areas where human beings make efforts; they also produced information on the types of nutrition-specific to the field. Now, students who continue their education and research in various departments of the faculty of sports sciences will soon perform physical education and sports teaching, coaching, and sports management in the field of sports. If they start their duties with the full knowledge of the area-specific nutritional properties, they will have a positive effect on the people who do sports to develop healthy eating behaviors.

Sport has personal and national goals. Personally; its healthy development helps to stay physically and mentally intact. Nationally, it contributes to the formation of a strong and powerful society in terms of emotions and behavior. Internationally; with the success of successful athletes or organizations in international sports organizations, countries perform tourism activities and have the opportunity to introduce themselves politically, socially, and culturally. The ability of successful athletes to perform at a high level also depends on their nutrition and well-being (Karakparmak, 1989). According to the World Health Organization (WHO), the intake of nutrients to meet the daily needs of the body is called nutrition. An adequate and balanced diet and regular physical activity are the basis of healthy life for individuals of all age groups and physiological conditions. However, nutrition is much more important especially for athletes who are in one of the risk groups in society. In other words, it is the process of taking the substances needed for physiological functioning in our body into the body and becoming usable as a result of digestion (Gunay, 1998). The intake and use of carbohydrates, proteins, fats, and vitamins necessary for the human body to continue vital activities in the body in appropriate ways and appropriate amounts is called adequate and balanced nutrition (Ersoy 1998). Inadequate and unbalanced nutrition occurs if the necessary nutrients are not taken in appropriate amounts in inappropriate ways. As a result, disruptions in growth and development cause diseases with reduced body resistance (Tanriverdi et al. 2011).

The chemical compositions needed for the growth, development, and regeneration of cells, the smallest unit in the human body, and tissue parts consisting of organic and inorganic substances existing in nature, are defined as nutrients. It can be said that at least 50 kinds of nutrients are needed (Sayan, 1999). Nutrients are examined in 2 groups as macronutrients and micronutrients. At the same time, energy-providing macronutrients are carbohydrates, proteins, and fats. Foods that do not contain energy and are called micronutrients are

vitamins, minerals, and water. For regular, balanced, and adequate nutrition, these substances need to be taken as much as the body needs (Campbell & Reece, 2013; Baysal, 2012; Gunes, 2009). Athletes who eat enough and balanced reach the optimum body function and composition (Thomas, 2016). All athletes must develop nutritional strategies to improve their physical and mental performance before, during, and after training or competition. It is stated in the evidence-based studies that the nutritional time and the content of meals help athletes to perform more effectively in training or competition (IOC, 2011). It is also provided to increase the adaptation of athletes who provide correct hydration with the intake of sufficient energy, macro, and micronutrients, to reach performance targets, and to reduce the risk of disease and disability (Dorfman, 2016). To increase performance, physical recovery after a competition, or training, to increase fitness and not to be affected by injuries, it is very important to have a proper diet (Aoi et al., 2006; Niess et al., 2007; Erdem et al., 2015; Bayansalduz, 2012 and 2014; Sahin and Guclu, 2018). Proper nutrition is the intake of adequate and necessary nutrients that the body needs. At the same time, proper nutrition is physiologically taken into the body in a sufficient and balanced manner in terms of quality and quantity in terms of gender and age variables (Baysal, 2012; Dulger, 2015; Arikan, 2015). The fact that athletes get the necessary energy from different foods instead of quality foods causes malnutrition. This situation, which negatively affects physical and mental development, causes athletes to face various problems. The protection of an athlete's health as a whole will be directly proportional to the care taken for adequate and balanced nutrition (Baysal, 2012; Karaagaoglu & Samur, 2015). The fact that there is a lot of scientific data proving that the performance of athletes increases with the importance given to nutrition cannot prevent the use of nutritional supplements for athletes from increasing. The lack of sufficient reviews and researches on these products, in particular, prevents all users from knowing their effects (McClung & Collins, 2007). All kinds of nutrients that aim to support physical development by increasing competition and training performance are called nutritional support products. In addition to the positive contributions of these substances, which are also defined as ergogenic aids, negative side effects can also be observed (Kreider et al., 2004).

Generally, athletes start to use nutritional supplements in anticipation of their positive effects, and negative effects can be ignored. Examples of these negative results are the decrease in performance, the tendency of health to deteriorate in the long term and the most important result for athlete's success to be recorded as positive doping agents (Maughan et al., 2004).

Low nutritional knowledge affects nutritional intake and performance in athletes (Devlin, 2014). Athletes should adopt nutritional strategies that improve their adaptation or improve their performance before and after training or

competition. However, studies have shown that athletes with low nutritional knowledge levels have high energy intake, fat, and added sugar consumption and inadequate nutrient intake (Kolodinsky, 2007). Also, it is stated that athletes with low nutritional knowledge are not aware of current recommendations and consume insufficient carbohydrates (Alaunyte, 2015).

It has been demonstrated by studies that nutrition education improves nutritional knowledge and nutritional status and this increase improves/enhances nutritional selection (Rossi, 2017; Philippou, 2017). Studies on sports nutrition are increasing day by day to support the literature, increase the evidence, and provide new approaches. Also, many international organizations see the nutrition of athletes as a developing science with their dynamics and conduct studies in this field (Thomas, 2016; IOC, 2011, Ronald, 2018).

In this study, it was aimed to compare the Nutritional knowledge Levels Before and After Nutrition Education of the Faculty of Sports Sciences Students.

MATERIAL AND METHOD

Population and Sample of the Study

The sample of the study consisted of 86 students from Usak University Faculty of Sports Sciences.

Study Material

In the study, a questionnaire consisting of 2 parts was used as a data collection tool. In the first part of the questionnaire, the questions to determine the demographic characteristics of the participants (17 questions), and in the second part, the "Sports Nutrition and Nutritional Knowledge Levels" (18 questions), (Appendix-2) are included. The research was carried out at Usak University Faculty of Sport Sciences on 10.03.2020, 11.03.2020, 12.03.2020. Participation in the study was provided based on the voluntariness of students of the Faculty of Sport Sciences of Usak University. The questionnaire validity level used in the research is 66.2%. The reliability level of the questionnaire used in the research is 65.41%. A questionnaire measuring nutritional knowledge levels was applied to the sample individuals participating in the study before the nutrition education was given. Next, nutrition education was given to the same individuals by the expert on the subject. After the individuals who participated in the study received nutrition education, a questionnaire measuring the nutritional knowledge levels was applied again.

FINDINGS

Sample individuals are predominantly included in the 20.21 age group. 83.7% of them are men and 16.3% are women. The education level of their mothers is predominantly 58.1% primary education and 17.4% uneducated. Their father's education level is predominantly 38.4% primary education and 18.6% secondary education. The income level of their mothers is predominantly between 0-1000 TL with 83.7% and in the group of 2001-3000 TL with 9.3%. Their father's income level is predominantly between 0-1000 TL with 40.7% and in the group of 2001-3000 TL with 9.3%. The sports branch distribution is predominantly 36% football, 8.1% volleyball, and 3.5% basketball. Sporting years are predominantly 3-5 years / 6-9 years with 27.9%, 1-2 years with 25.6%, 10 years, and over with 18.6%. 41.9% of individuals do sports with a license and 58.1% without a license. 31.4% of individuals consume alcohol and 37.2% consume cigarettes. 7% have hereditary disease status. 86% of them did not receive nutrition education. 11.6% of them went to the dietician. 23.3% used supplementary food. The metabolic of 40.7% of individuals works fast, while 59.3% of them work slowly. 34.9% of the individuals' body fat is high.

Table 1. Mann-Whitney U Test on Nutritional Knowledge Differences Before and After Nutrition Education of the Students

	Measurement Group	N	Mean Rank	Z	p
Nutritional Knowledge Levels of the Students	Before Nutrition Education	86	95,54	-2,409	0,016
	After Nutrition Education	86	77,46		
	Total	172			

When Table 1 is examined, there is a significant difference between the nutritional knowledge levels of the students after receiving nutritional education and the nutritional knowledge levels before receiving nutritional education ($p < 0.05$). Nutrition education given to individuals increased their nutritional knowledge level.

Table 2. Analysis of the Difference between Monthly Income of Students' Fathers' and Nutrition Information Before Receiving Nutrition Education

Income Level of Fathers	N	Mean Rank	x2	sd	p
0-1000TL	16	43,28	9,229	3	0,029*
1001-2000TL	16	29,00			
2001-3000 TL	35	51,17			
30001 and more	19	41,70			
Total	86				

$P < 0,05$

When Table 2 is examined, the Kruskal Wallis test was carried out to determine whether there is a significant difference between the monthly income level of the fathers of the students and the nutritional knowledge levels before receiving nutritional education. There is a significant difference between the monthly income level of the fathers of the students and the nutritional knowledge levels before receiving nutritional education ($X^2 = 9,229$; $sd = 3$; $p = 0.029$; $p < 0.05$). Students whose fathers' monthly income is between 2001-3000 TL are the ones with the highest nutritional knowledge level (**Mean Rank = 51,17**). Then the students whose fathers are in the 0-1000 TL, 3001 TL, and above and 1001-2000 TL income groups, respectively.

Table 3. Analysis of the Difference Between Monthly Income of Students' Fathers' and Nutrition Information After Receiving Nutrition Education

Income Level of Fathers	N	Mean Rank X	X ²	sd	p
0-1000TL	16	49,33			
1001-2000TL	16	33,09			
2001-3000 TL	35	50,51	9,02	3	0,026*
30001 and more	19	34,90			
Total	86				

When Table 3 is examined, the Kruskal Wallis test was conducted to determine whether there is a significant difference between the monthly income level of the fathers of the students and the nutritional knowledge levels after receiving nutritional education. According to the results of the analysis, there is a significant difference between the monthly income level of the fathers of the students and the nutritional knowledge levels after receiving nutrition education ($X^2 = 9.02$; $sd = 3$; $p = 0.026$; $p < 0.05$) Students whose fathers' monthly income is between 2001-3000 TL are the ones with the highest nutritional knowledge level (**Mean Rank = 50,51**). However, the level of knowledge of this group of students decreased significantly. Then, there was a significant increase in the nutritional knowledge levels of the students whose fathers have a 0-1000TL income level, respectively. It is seen that students who have a monthly income level of 3001 and above experienced a significant decrease in their nutritional knowledge after receiving nutritional education. Although the students whose fathers' monthly income level is in the 1001-2000 TL income group are in the last place, there is a significant increase in their nutritional knowledge levels after receiving nutrition education.

Table 4. Analysis of the Difference Between Students' Sporting Duration and Nutritional Knowledge Before Receiving Nutritional Education

Sporting Years	N	Mean Rank	X ²	sd	p
1-2 Years	22	35,91			
3-5 Years	22	50,44	5,290	3	0,152
6-9 Years	24	47,15			
10 Years and more	16	38,06			
Total	86				

When Table 4 is analyzed, no significant difference was found between the duration of the students' sporting and the nutritional knowledge levels before receiving nutritional education ($p < 0.05$).

Table 5. Analysis of the Difference Between Students' Sporting Duration and Nutritional Knowledge After Receiving Nutritional Education

Sporting Duration	N	Mean Rank	X ²	sd	p
1-2 Years	22	32,86			
3-5 Years	22	50,71	8,226	3	0,042*
6-9 Years	24	49,40			
10 Years and more	16	38,47			
Total	86				

When Table 5 is examined, the Kruskal Wallis H test was performed to determine whether there is a significant difference between the duration of the students' sporting and the nutritional knowledge levels after receiving nutritional education. As a result of the analysis, there is a significant difference between the duration of the sporting and the nutritional knowledge levels of the students after receiving nutritional education ($X^2 = 8,226$; $sd = 3$; $p = 0,042$; $p < 0,05$). The group with the highest increase in nutritional knowledge is the group with 6-9 years of sporting (**Mean Rank = 49,40**). On the other hand, after receiving nutritional education, the nutritional knowledge of the group, who did sports for 1-2 years, fell below the level before training.

Table 6. Analysis of the Differences Between Students' Alcohol Consumption and Nutritional Knowledge Before Receiving Nutrition Education

Alcohol Consumption Status	N	Mean Rank	Z	Wilcoxon W	p
Yes	27	43,3	-0,52	1169	0,959
No	59	43,59			
Total	86				

The Mann Whitney U test was conducted to determine whether there is a significant difference between whether individuals consume alcohol or not and the nutritional knowledge before they receive nutritional education. It was stated that there was not a significant difference between whether individuals consume alcohol or not and the nutritional knowledge before they receive nutritional education.

Table 7. Analysis of the Differences Between Students' Status of Alcohol Consumption and Nutritional Knowledge After Receiving Nutritional Education

Status of Alcohol Consumption	N	Mean Rank	Z	Wilcoxon W	p
Yes	27	34,74	-2,234	938	0,025*
No	59	47,51			
Total	86				

When table 7 is examined, The Mann Whitney U test was conducted to determine whether there is a difference between students' status of alcohol consumption and nutritional knowledge after receiving nutritional education. According to the analysis, there is a significant difference between students' status of alcohol consumption and nutritional knowledge after receiving nutritional education ($p < 0.05$). Nutritional knowledge levels of students who did not consume alcohol increased after receiving nutritional education (**Mean Rank = 47.51**). Nutritional knowledge levels of students using alcohol decreased after receiving nutrition education.

Table 8. Analysis of the Differences Between Students' Use of Supplementary Food and Nutritional Knowledge Before Receiving Nutritional Education

Status of Using Supplementary Food	N	Mean Rank	Z	Wilcoxon W	p
Yes	20	54,58	-2,293	2649,5	0,025
No	66	40,14			
Total	86				

When Table 8 is analyzed, the Mann Whitney U-test was conducted to determine whether there is a difference between students' use of supplementary food and nutritional knowledge before receiving nutritional education. According to the results of the analysis, there is a significant difference between whether students use supplementary food or not and their nutritional knowledge before they receive nutritional education ($U = -2,293$; $p = 0.025$; $p < 0.05$). Students who take supplementary food (**Mean Rank = 54.58**) have higher nutritional knowledge than students who do not take supplementary food (**Mean Rank = 40.14**).

Table 9. Analysis of the Differences Between Students' Use of Supplementary Food and Nutritional Knowledge After Receiving Nutritional Education

Status of Using Supplementary Food	N	Mean Rank	Z	Wilcoxon W	p
Yes	20	51,58			
No	66	41,23	-1,557	2,721	0,12
Total	86				

When Table 9 is analyzed, the Mann Whitney U-test was conducted to determine whether there is a difference between students' use of supplementary food and nutritional knowledge after receiving nutritional education. According to the results of the analysis, there is no significant difference between whether the students use supplementary food or not and nutritional knowledge after receiving nutritional education. The education given to students did not cause an increase in the nutritional knowledge level of students who did not take additional food. This situation shows that the information gap is closed. On the other hand, the nutritional knowledge level of students who do not take additional food has increased a little, and the nutritional knowledge levels of students who have received additional food have decreased slightly.

Table 10. Analysis of the Differences Between Students' Knowledge of Basal Metabolic Rate and Nutritional Knowledge Before Receiving Nutritional Education

Status of Knowledge of Basal Metabolic Rate	N	Mean Rank	Z	Wilcoxon W	p
Yes	35	49,86			
No	51	39,14	-1,981	1996	0,048*
Total	86				

When Table 10 is examined, the Mann Whitney-U test was performed to determine whether there is a difference between students' knowledge of basal metabolic rate and nutritional knowledge before receiving nutritional education. As a result of the analysis, there is a significant difference between the students' knowledge of basal metabolic rate and their nutritional knowledge before receiving nutritional education ($U = -1,981$; $p = 0,048$; $p < 0,05$). It is determined that students who know the basal metabolic rate have higher nutritional knowledge levels (**Mean Rank: 49.86**) than those who do not (**Mean Rank: 39.14**).

Table 11. Analysis of the Differences Between Students' Knowledge of Basal Metabolic Rate and Nutritional Knowledge After Receiving Nutritional Education

Status of Knowledge of Basal Metabolic Rate	N	Mean Rank	Z	Wilcoxon W	p
Yes	35	51,58			
No	51	41,23	-0,129	1508	0,897
Total	86				

When Table 11 is examined, the Mann Whitney-U test was conducted to determine whether there is a difference between students' knowledge of basal metabolic rate and nutritional knowledge after receiving nutritional education. As a result of the analysis, there is no significant difference between students' knowledge of basal metabolic rate and their nutritional knowledge after receiving nutritional education ($p > 0.05$). Students who know the basal metabolic rate experienced a decrease in their nutritional knowledge after receiving nutritional education. The same decrease is observed in students who do not know the basal metabolic rate. On the other hand, after receiving nutritional education, the difference between students' nutritional knowledge disappeared.

Table 12. Analysis of the Differences Between Students' Body Fat Ratio Status and Nutritional Knowledge Before Receiving Nutritional Education

Knowledge of Body Fat					
Ratio Status	N	Mean Rank	Z	Wilcoxon W	p
Yes	30	52,03	-2,349	2180	0,019*
No	56	38,93			
Total	86				

When Table 12 is examined, the Mann Whitney-U test was conducted to determine whether there is a significant difference between students' knowledge of body fat ratio status and their nutritional knowledge before receiving nutritional education. As a result of the analysis, there is a significant difference between students' knowledge of body fat ratio status and their nutritional knowledge before receiving nutritional education ($U = -2.349$; $p = 0.019$; $p < 0.05$). Nutritional knowledge levels of students who know body fat rates (**Mean Rank = 52.03**) are higher than students who do not know (**Mean Rank = 38.93**).

Table 13. Analysis of the Differences Between Students' Body Fat Ratio Status and Nutritional Knowledge After Receiving Nutritional Education

Knowledge of Body Fat					
Ratio Status	N	Mean Rank	Z	Wilcoxon W	p
Yes	30	48,22	-1,302	2294,5	0,193
No	56	40,97			
Total	86				

When Table 13 is examined, the Mann Whitney-U test was conducted to determine whether there is a significant difference between students' knowledge of body fat ratio status and their nutritional knowledge after receiving nutritional education. As a result of the analysis, there is not a significant difference between

students' knowledge of body fat ratio status and their nutritional knowledge after receiving nutritional education ($p>0,05$). On the other hand, after receiving nutrition education, the difference between students' nutritional knowledge disappeared.

DISCUSSION AND CONCLUSION

In this study, it was discussed whether “the Nutritional Knowledge Levels of the Faculty of Sport Sciences Students Before and After Nutrition Education” differed. In the data obtained there is a significant difference between the nutritional knowledge levels of individuals after receiving nutritional education and the nutritional knowledge levels before receiving nutritional education. Nutritional education given to individuals increased their nutritional knowledge level.

In a study that they gave nutrition education to 11 female volleyball players between the ages of 19-22 for one season; Valliant et al. (2012) found that the nutritional knowledge level of athletes increased significantly.

In another study, 54 individuals with an average age range of 16-19 years were given nutritional education 6 times in total for 6 months, and similarly to this study, individuals' knowledge of nutrition increased (Baldasso, 2016).

In a study conducted by Molina-Lopez et al., (2013); 14 handball players, whose average age was 22.9 years, were given nutritional training for 8 weeks, and observed significant changes in the total energy intake of the athletes. The reason for obtaining different results from this study may be due to the shorter duration of education compared to other studies and the nutritional habits do not change in a short time.

Demirözü et al., (2012) in a control group study with 78 girls between the ages of 8 and 12 who attended sports school; found that nutritional knowledge levels of the group who received nutrition education increased significantly compared to the control group.

In a study by (Abood, 2004), with 15 control players with a mean age of 19.6 years and 15 swimmers, a total of 30 athletes were given nutrition education for 8 weeks; and there was a significant increase in the nutritional knowledge levels of athletes in the intervention group compared to the control group after the education. Similar results were obtained in this study.

In their study by providing nutrition education for 11 first league female volleyball players between 19-22 years of age for one season; Valliant et al., (2012) reported that the energy intake of athletes increased significantly after the training.

As a result of the study carried out by providing nutrition education for 11 female volleyball players with an average age of 19.8 years, a significant decrease in body fat rates of volleyball players participating in the post-education study was observed (Wenzel, 2012).

In the study where 11 1st league female volleyball players, whose ages were between 19-22, Valliant et al., (2012) provided nutrition education for one season, and there was a significant decrease in body fat before and after education, and a significant increase in fat-free body masses.

In another study where 11 football players with an average age of 16.6 years were given nutrition education for 8 weeks; unlike this study, there was no significant change in the BMI of the players (Schawartz, 2014) and this difference may be due to the racial differences and habits of the individuals participating in the study.

Adequate and balanced nutrition is important in terms of affecting people's health and success and giving good eating habits to the generations in the future (Arli 1991).

Since it will only be possible with nutritional education to provide people with adequate and balanced eating habits, to prevent food from becoming disruptive to health, and to improve the nutritional status through the more efficient economic use of food sources; it was thought that nutritional education should be given to individuals, families, especially families with children.

In line with the principle of "Nutrition is the basis of health", studies that increase the nutritional knowledge level of all individuals in society should be done. First of all, the nutritional knowledge levels of the people in occupational groups working on important issues such as education and health of the society should be determined; then, other sections of the society should be reached through various projects. For this type of research in our country, nutritional information question banks specific to various groups should be established and evaluation methods should be developed.

As a result, it can be said that all kinds of studies should be done in order to increase the nutritional knowledge level from the beginning years of education to the upper education level.

REFERENCES

- 1) Alaunyte, I.J.L. Perry, and Aubrey, T. (2015) Nutritional knowledge and eating habits of professional rugby league players: does knowledge translate into practice?. *Journal of the International Society of Sports Nutrition*, 12-18.

- 2) Abood D.A., Black D.R., Birnbaum R.D. Nutrition Education Intervention for Collage Female Athletes. *J Nutr Educ Behav* 36(3):135-7,2004.
- 3) Aoi W. Nait. Y. Yoshikawa T. (2006). Exercise and Functional Foods. *Nut. J.*
- 4) Arikan Z.Y. (2015). Nutrition Habits of University Students: Dumlupinar University Example. Institute of Science. Master Thesis. Kutahya: Dumlupinar University.
- 5) Arli, M. (1991). Nutrition and Academic Success Status of University Students, Selcuk University Girls Art Education High School, Project, Konya, 1991.
- 6) Baldasso JG, Galante AP, Ganen DP. (2016). Impact of actions of food and nutrition education program in a population of adolescents. *Rev. Nutr, Campinas* 29(1):65-75.
- 7) Bayansalduz M. (2012). Analyzing the relationship between task and ego orientation, collective efficacy and perceived coaching behavior: A research on footballers. *Energy Education Science and Technology Part B*, 4(1):481-494.
- 8) Bayansalduz M. (2014). An Investigation into the State-Trait Anger Expression Level of Taekwondo Students Attending High School, *The Anthropologist*, 18:3, 921-926, DOI: 10.1080/09720073.2014.11891624
- 9) Baysal A. Beslenme, Ankara, Hatiboglu Yayincilik, 2012:12-24.5.
- 10) Campbell N.A. Reece, J.B. *Campbell Biology*. Gunduz E., Turkan G. (Cev.), Ankara, Palme Publications, 2013:32-4.
- 11) Demirozu B.E., Pehlivan A., Camliguney A.F. (2012). Nutrition knowledge and behaviours of children aged 8-12 who attend sport schools, *Procedia – Social and Behavioral Sciences* 46:4713 – 4717.
- 12) Devlin, B.L., and Belski, R. (2014). Exploring General and Sports Nutrition and Food Knowledge in Elite Male Australian Athletes. *International Journal of Sport Nutrition and Exercise Metabolism*, 25(3), 225-32.
- 13) Dorfman, L. (2016). Nutrition in Exercise and Sports Performance. In L. Kathleen Mahan and J. Raymond, (Eds), *Krause's Food & the Nutrition Care Process*. Riverport Lane. Elsevier, pp. 426-455.
- 14) Dulger H. (2015). Bartın University Health Services Vocational School Students' Nutritional Habits and Obesity Prevalence. Health Sciences Institute. Master Thesis. Duzce: Bartın University.
- 15) Erdem, K., Çağlayan, A., Korkmaz, O.Z., Bozdoğan Kızılet, T., & Özbar, N. (2015). The evaluation of body mass index, balance and agility features of amateur soccer players according to their positions.

- Uluslararası Spor, Egzersiz & Antrenman Bilimi Dergisi; Vol 1, No 2 (2015): December 2015.
- 16) Ersoy G. (1998). *Healthy Life, Sports and Nutrition*. Ankara, Damla Printing, 84.
 - 17) Gunay M. (1998). *Exercise Physiology*, Ankara, Bagirgan Publishing House, 45.
 - 18) Gunes Z. (2009). *Sports and Nutrition*. Ankara, Nobel Publications, 41.
 - 19) Internet: World Health Organisation. Nutrition. 2018-08-03. URL: <http://www.webcitation.org/query?url=http%3A%2F%2Fwww.who.int%2Ftopics%2Fnutrition%2Fen%2F&date=2018-08-06>, Son erisim tarihi: 07/0/2018.
 - 20) Karaagaoglu N. Samur, GE. (2015). *Maternal and Child Nutrition*, Ankara, Pegem Academy Publications, 69.
 - 21) Karakucuk S. (1989). *Education of a Physical Education Teacher*, Ankara, Gazi University Publications, 24.
 - 22) Kolodinsky, J., Harvey-Berino, J.R., Berlin, L., Johnson, R.K. and Reynolds, T.W. (2007). Knowledge of current dietary guidelines and food choice by college students: better eaters have higher knowledge of dietary guidance. *Journal of The American Dietetic Association*, 107(8), 1409-13.
 - 23) Kreider R.B. (2004). *Exercise & Sport Nutrition Review: Research & Recommendations*, *Sports Nutrition Review Journal*, 1 (1), s. 1-44.
 - 24) Maughan R.J. King D.S. Lea T. (2004). *Dietary Supplements*. *Journal of Sport Science*, 22:95-113.
 - 25) McClung M. Collins D. Because (2007). *I Know it Will: Placebo Effects of an Ergogenic Aid on Athletic Performance*. *Journal of Sports & Exercise Psychology*.
 - 26) Molina-López J., Molina J.M., Chiroso L.J. et al. (2013). Implementation of a nutrition education program in a handball team; consequences on nutritional status. *Nutr Hosp* 28(3):1065-1076.
 - 27) Niess A.M. Hipp A. Thoma S. Striegel, H. (2007). *Performance Food in Sport*. *Therapeutische Umschau*.
 - 28) Philippou, E. Middleton N., Pistos C., Andreou E., and Petrou M. (2017). The impact of nutrition education on nutrition knowledge and adherence to the Mediterranean Diet in adolescent competitive swimmers. *Journal of Science and Medicine in Sport*, 20(4), 328-332.
 - 29) Ronald J.M., Louise M.B., Jiri D., Enette L., Peter P., and Stuart M.P. (2018). *IOC Consensus Statement: Dietary Supplements and the High-Performance Athlete*. *International Journal of Sport Nutrition and Exercise Metabolism*, 28(2), 104-125.

- 30) Rossi, F.E. Landreth, A., Beam, S., Jones, T., Norton, L., and Cholewa, J.M. (2017). The Effects of a Sports Nutrition Education Intervention on Nutritional Status, Sport Nutrition Knowledge, Body Composition, and Performance during Off Season Training in NCAA Division I Baseball Players. *Journal of Sports Science and Medicine*, 16(1), 60-68.
- 31) Sayan A. (1999). Nutrition Habits and Basic Food Requirements. *Ataturk University Nursing School Journal*, 2(2):24-29.
- 32) Schawartz A.K. (2014). The Effect Of A Nutrition Education Program On Nutrition Knowledge, Dietary Intake, Body Composition And Perceived Sport Performance Among High School Athletes, Master Thesis, University of Kentucky College of Agriculture, Food and Environment, Kentucky.
- 33) Tanriverdi D. Savas E. Gönülluoglu N. Kurdal E. ve Balik G. (2011). Investigation of high school students' eating attitudes, eating behaviors and self-esteem. *Gaziantep Medical Journal*, 170, 33-39.
- 34) Thomas, D.T., Erdman, K.A., and Burke, L.M. (2016). American college of sports medicine joint position statement. nutrition and athletic performance. *Medicine & Science Sports & Exercise*, 48(3), 543-568.
- 35) Valliant M.W., Emplaincourt H.P., Wenzel R.K. et al. (2012). Nutrition Education by a Registered Dietitian Improves Dietary Intake and Nutrition Knowledge of a NCAA Female Volleyball Team, *Nutrients* 4(6):506–516.
- 36) Wenzel R.K., Valliant M.W., Chang Y. et al. (2012). Dietary Assessment and Education Improves Body Composition and Diet in NCAA Female Volleyball Players, *Clinical Nutrition* 27(1):67-73.