TÜRKİYE CUMHURİYETİ
ANKARA ÜNİVERSİTESİ
SAĞLIK BİLİMLERİ ENSTİTÜSÜ

COMPARISON OF SPORTS NUTRITION KNOWLEDGE, SUPPLEMENT USAGE AND ORTHOREXIA TENDENCIES BETWEEN DIFFERENT SPORT BRANCHES

Esra AYDEMİR

DEPARTMENT OF PHYSICAL ACTIVITY, HEALTH AND SPORT

MASTER'S THESIS

ADVISOR

Assoc. Professor Fırat AKÇA

ANKARA

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Ethical Declaration

To Ankara University

Health Sciences Institute Directorate,

The thesis titled "Comparison of Sports Nutrition Knowledge, Supplement Usage and Orthorexia Tendencies Between Different Sport Branches.", which I prepared and presented as a master's thesis; Written by me in accordance with scientific ethics and values. The idea/hypothesis of my thesis is entirely my own and my thesis advisor. The experimental work/research in the thesis was made by me, and all sentences and comments are my own. I declare that the above-mentioned facts are correct.

Name Surname:

Date:

Signature:

Acceptance and Approval

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PREFACE

The purpose of this thesis is to investigate orthorexia nervosa tendency and sports nutrition knowledge of athletes and to seek out if there is any interrelation of sport nutrition knowledge and orthorexia tendency.

I would like to express my deepest gratitude and respect to everyone who contributed to this work to my thesis advisor, who helped me throughout my studies, Ankara University Sports Sciences Faculty Member Assoc. Dr. To Fırat Akça and all my professors, to the athletes participating in the research, and to my precious family, who made me feel loved and supported throughout the study and were always there for me.

ABBREVIATIONS

ACSM	American College of Sports Medicine
ADA	American Dietetic Association
AIS	Australian Institute of Sport
ATP	Adenosine triphosphate
BCAA	Branched chain amino acids
BMI	Body Mass Index
DSM-V	Diagnostic and Statistical Manual of Mental Disorders-V
DXA	Dual-energy X-ray absorptiometry
G	Gram
HMB	Beta-hydroxy betamethyl butyrate
IOC	International Olympic Committee
ISSN	The International Society of Sports Nutrition
Kg	Kilogram
µg	Microgram
LDL	Low density lipoprotein
NAD	Nicotinamide Adenine Dinucleotide (
NADP	Nicotinamide Adenine Dinucleotide Phosphate
ON	Orthorexia nervosa
PTH	Parathyroid hormone
T3	Triodothyronine
T4	Thyroxine
TUBER	Turkey Nutrition Guide

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1. INTRODUCTION

World Health Organization (WHO) describes health as a physically, mentally and socially total well-being status with the absence of illness and disability. Human health is influenced by many factors such as climate, heredity, environmental conditions and particularly nutrition. Adequate and balanced nutrition is not only the basic condition for the vital activities of the individuals but the development of the whole society. For individuals in all age groups and physiological status, adequate and balanced nutrition and regular physical activity are the basis of healthy life. However, nutrition is much more important, especially for athletes, one of the risk groups in the community (Baysal, 2009).

Various changes and transitions arising in nutritional habits with a rapid change in urbanization, economic development, globalization, and lifestyle. These changes make nutrition and eating attitudes a subject that is frequently discussed in various aspects (Dapi et al., 2011).

Alterations in eating attitudes lead to many problems conduce to eating disorders. Since eating disorders have psychological aspects as well as physiological aspects, eating disorders have led to the necessity of further discussion on the psychological aspects of nutrition (Aydemir and Köroğlu, 2007).

The desire to attain ideal body size and an increase in the proportion of individuals who tend to follow a continuous diet are shown to be the reason for the spread of eating disorders. Pica, Rumination Disorder, Avoidant/ restricted food intake disorder, anorexia nervosa, bulimia nervosa, and binge eating disorder are all eating disorders which demonstrated in the Diagnostic and Statistical Manual of Mental Disorders-V (DSM-V) (DSM-V, 2013).

Orthorexia nervosa (ON) refers to the pathological condition associated with the consumption of healthy food. Orthorexia nervosa is an important type of eating

disorder in which over-occupation of foods quality, purity and healthy eating is at the forefront. It has been observed that over-dealing with strict rules on healthy eating takes up most of the time of these patients and may lead to deterioration of social functions (Zincir, 2014).

Orthorexia nervosa is a pathological obsession with the consumption of biologically pure, healthy foods that do not contain herbicides, pesticides or artificial substances and this obsession is related to behaviour rather than the amount of food content (Bartrina, 2007).

Women are more likely to develop orthorexia nervosa than men since women are significantly more worried to have a nicer and slimmer figure. Orthorexia nervosa symptoms are more common especially in people who are obsessed with staying at a certain weight, models, dancers, gymnasts, physicians, dietitians, individuals with anxiety, obsessive-compulsive individuals, and individuals who give excessive importance to body image (Davidson et al., 2004).

In the general population, the prevalence of these psychopathological disorders ranges between 1% and 4%. Athletes have a higher prevalence of eating disorders than the general population (Torstveit et al., 2008). The fact that athletes are more likely to develop eating disorders is associated with factors such as increased intensity of training, competition, and social pressure (Martinsen et al., 2010).

The contradiction between perceived body type by society according to sport branches and own body of an athlete creates pressure on athletes and causes eating disorders (Giel et al., 2016). For this reason, eating disorders are observed with a higher prevalence in weight, endurance and aesthetic sports (Currie, 2010).

Unconscious energy restriction and loss of body weight by athletes in order to increase lean body mass and decrease body weight can also cause eating disorders (Bratland-Sanda and Sundgot-Borgen, 2013). Due to the restriction of nutrient intake

in athletes, various mechanisms may impair sports performance. These mechanisms include decrease in glycogen stores and decrease in physical, psychological and mental capacity, muscle pain due to increased lactate in circulation, muscle cramps due to dehydration and loss of muscle mass due to loss of lean body mass (El Ghoch et al., 2013).

Trainers, athletes and families need to be informed on the risk factors associated with eating disorders. In order to prevent eating disorders, athletes need to receive nutritional education support that improves their health and performance. In athletes, the risk of developing eating disorders is less if weight loss is provided gradually and under controlled and expert supervision (Currie, 2010).

With adequate energy, macro and micronutrient intake, the adaptation of the athletes to the correct hydration can be increased, the risk of illness and disability are reduced, and the achievement of performance targets get easier (Dorfman, 2016). Low nutritional knowledge affects food intake and performance in athletes (Devlin and Belski, 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 have insufficient nutrient intake (Kolodinsky et al., 2007).

The purpose of this thesis is to find out if any different exist between professional and semi-professional team sports athletes and professional and semi-professional individual sports athletes in terms of orthorexia nervosa tendency and in terms of sports nutrition knowledge. As well as to reveal the association between sport nutrition knowledge level and orthorexia tendency if it is the case. Furthermore, to search connection between age of the athletes and sports nutrition knowledge level.

Previous researches focused on either sports nutrition knowledge level or orthorexia tendency of athletes. There is no research aimed to investigate the association between sports nutrition knowledge level and orthorexia nervosa.

1.1. GENERAL INFORMATION

1.1.1 Sports Nutrition

1.1.1.1. History of Sports Nutrition

It is stated that the history of sports nutrition started with Milo of Croton, a Greek legend. Legend has it that Milo consumed 9 kilogram(kg) of meat, 9 kg of bread and approximately 9 litres of wine daily and won 5 Olympic games successively in wrestling branch. If the legend were to be true, it is estimated that this athlete's daily was about 57000 kcal (Grandjean, 1997). It is also stated that Charmis of Sparta consumed dried figs shortly before competitions. It is stated that the marathon runners did not consume any food the night before the competition in the 1896 Athens Olympics, known as the beginning of the modern Olympics, and that they consumed egg white, cognac and toxic substances such as strychnine in the 2nd Olympics (Juzwiak, 2016). With the studies and developments in the field of sports nutrition, the International Olympic Committee (IOC) stated that nutrition is a highly effective factor in performance of athletes; the amount, composition and timing of the food consumed will prevent injuries and that a good nutrition strategy will maximize the performance (IOC, 2011). Individuals subscribed in a regular fitness program have no difficulty meeting their macro nutritional needs by maintaining their usual diet (45- 60% carbohydrate, 12-15% protein, 25-30% fat). However, athletes who train with medium or high-density programs need to consume more carbohydrate and protein than they do in their usual diets in order to meet their macronutrients (Ersoy, 2013). It is known that an adequate and balanced diet will increase the success of athletes by improving their performance.

1.1.1.2 Importance of Nutrients for Athletes

The food pyramid for healthy individuals created with Turkey Nutrition Guide (2015 TUBER) consists of grains at the bottom layer, and vegetables and fruits above it. On the top layer of the pyramid are sweeteners and salt, and water is located outside the pyramid (Tuber, 2015). However, food pyramids developed for athletes is a different case. For instance, in the case of the food pyramid developed for athletes in Switzerland, water and drinks consist of the bottom layer of the pyramid. The upper layers consist of, respectively, vegetables-fruits and grains (Mettler et al., 2009). Adequate and balanced energy intake is the most important point in sports nutrition, as it will help balance the body composition or bring it to the desired level (Thomas et al., 2016). There are differences between the daily diet of sedentary healthy individuals and athletes, in terms of ingredients, as well as amount and frequency. Since athletes need more energy, the amount of food they consume is higher than sedentary healthy individuals. In addition, increased frequency of food intake ensures control of hunger and appetite while regulating blood total cholesterol, low density lipoprotein (LDL) and insulin levels. Also, it is stated that the lean body mass of an athlete is preserved even if the energy intake is low, provided that the amount of protein consumed is sufficient (La Bounty et al., 2011).

1.1.1.3. Carbohydrates

Carbohydrates are one of the nutrients that provide energy to the body. They are organic compounds made up of carbon, oxygen, and hydrogen. Carbohydrates vary in their structures and names, depending on the number of these 3 elements, their combinations, and their use by humans. Carbohydrates are stored as glycogen in human and animal tissues (Baysal, 2009). While 300-400 grams of stored carbohydrates are stored as muscle glycogen in muscles, 75- 100 grams of them are stored in the liver (Doyle et al., 2008). When blood glucose decreases, the glycogen in the liver is hydrolyzed to glucose and it mixes with blood to become an energy source

for the brain and other tissues. The glycogen in muscles is used only to ensure that muscle movements are preserved and maintained (Whitney and Rolfes, 2013). It has been discussed since the beginning of the 20th century that carbohydrates are important for athletes and should be consumed more than other macronutrients. It was put forward in a study by Krogh and Lindhard (1920). Comparison of carbohydrates and fats as the energy source of the muscles was carried out and it was concluded that carbohydrates are efficient in muscle activity. With the Boston Marathon in 1924, carbohydrates were found to reduce contraction and concentration impairment, which lead to discussions emphasizing their importance for endurance athletes, and more studies began to be carried out on the issue (Applegate and Grivetti, 1997).

Many studies were carried out in the following years, and athletes started to compete by taking high amounts of carbohydrates the day before the competition. With the fact that the high-carb diet is also important in endurance sports before training, which was discovered towards the end of the sixties, a periodization called carbohydrate loading emerged (Bergström et al., 1967) The process called carbohydrate loading is the process of preparing athletes for competitions by having them consume starch-rich foods containing a large amount of carbohydrates, along with endurance exercises in the period before the competition/game. It was first proposed by Scandinavian scientists Hultman and Bergstrom in 1967. Classical carbohydrate loading starts 1 week before the competition, and glycogen stores in muscles are super compensated with exercises that will exhaust glycogen stores in 3 to 4 days and very low carbohydrate diet (> 60%). In another carbohydrate loading protocol called modified carbohydrate loading, 3 days before the competition, the intensity of the exercise is reduced day by day, consuming carbohydrates just enough to meet 50% of the daily energy requirement, and in the following 3 days, Carbohydrate is consumed in amounts that meet 70% of the daily energy requirement, and the athletes compete on the 7th day. It is stated that the modified carbohydrate loading model has the same effect as the classical model (Haff, 2008). This protocol does not include the tiring exercises that deplete glycogen stores, which are included in the classical loading. High-carb diets were adopted in later periods, regardless of whether glycogen stores are depleted.

Timing of nutrition is examined in 3 stages, namely, before, during and after training. As in previous periods, carbohydrates remain important for individuals engaged in endurance sports. The International Society of Sports Nutrition (ISSN) published its report on the timing of macronutrient intake for the training performance and body composition of individuals who are healthy, exercise and train, for the second time in 2017 after it was published in 2008. Considering that the athletes cannot adequately meet their carbohydrate and daily energy needs, it is stated that the glycogen stores must be reinstated before the next competition as a priority. The report states that glycogen stores are limited and are exhausted after a few hours at best, and it is suggested that carbohydrate intake before, during and after training is important. It is stated that carbohydrates taken before training increase oxidation and make glycogen stores last longer. Also, the latest report published examines the effects of carbohydrate consumption on endurance and resistance exercises separately and states that carbohydrates are used as an energy source for both exercise types and even that energy is dependent on carbohydrates. The amount of carbohydrate that needs be taken by individuals who exercise more than 70% VO_2max and over 12 hours a week is 5-12 gram(g)/ kilogram(kg)/day, and the upper end of this range is stated to be 8-10 g/kg/day. Many studies have also been conducted on the type and amount of carbohydrates that should be taken in the meal before the competition (in a period of less than 4 hours before the competition). In the studies conducted, it was concluded that, regardless of the glycemic index, the carbohydrate taken 30-45 minutes before the competition and the carbohydrate taken 135-150 minutes before the competition did not have different effect on performance, and it was advised not to consume too much carbohydrate or liquid before competition (Kerksick et al., 2017). This result was obtained in a study by Bussau et al. by having athletes consume 8-10 g/kg/day carbohydrate the day before the competition, regardless of the glycemic index (Bussau et al., 2002). Foods with high glycemic index are digested quickly and pass into the blood as glucose, while foods with low glycemic index are digested slowly (Haff, 2008).

Recovery of muscle glycogen after exercise is the main nutritional goal. When the relationship between 2 g/kg carbohydrate consumption within 30 minutes immediately after training and 2 g/kg carbohydrate consumption within 4 hours after training is examined, it is stated that there is 50% more recovery in muscle glycogen with carbohydrate consumed within 30 minutes after training. It is also stated that it is beneficial to take 0.6-1.0 g/kg carbohydrate within 30 minutes immediately after the exercise, and even that the same amount of carbohydrate should be consumed every 2 hours within the following 6 hours. It is also stated that it may be beneficial to consume 1.2 g/kg of carbohydrate every 30 minutes for the 3rd and 5th hours after the training (Kerksick et al., 2017).

In addition to the recommended amounts of carbohydrates, it is stated that it would be beneficial to use complex and different types of carbohydrates together (Kreider et al., 2010). It is stated that the importance of timing of intake decreases when carbohydrate consumption is sufficient, but carbohydrate consumption before, during or after training will not have a negative effect. In addition, it is stated that the glycogen stores of athletes who consume more than 8 g/kg/day of carbohydrate recover in 24 hours and, if insufficient carbohydrate consumption is suspected, the timing of carbohydrate intake is of great importance (Kerksick et al., 2017).

1.1.1.4. Lipids

Parts of animal and plant tissues that do not dissolve in water but dissolve in solvents such as ether, gasoline, chloroform are called lipids. They contain organic elements in different chemical structures. The most important of these are simple lipids such as fats and waxes, and compound lipids such as phospholipids, glycolipids, and steroids (Aksoy, 2008). There is no clear recommendation about the amount of fats that should be consumed by athletes, but there are studies on the effects of fatty acids on cognitive performance and inflammation (Mickleborough, 2013). Fats are also important in terms of the energy they provide compared to carbohydrates and proteins,

their involvement in the structure of the cell membrane, the transmission of nerve signals that stimulate muscle contraction, the transport and storage of vitamins A, D, E, K, and delaying feeling hungry (Jennifer, 2008). It is thought that they must be consumed after training to restore the intramuscular triglycerides used during training, and it is stated that intramuscular triglycerides can be restored if daily consumption is 2 g/kg/day. In a study conducted, it is stated that the number of triglycerides in the muscles decreased by 25% with a treadmill training performed with 67% VO2max for 2 hours. When it was examined whether the triglycerides in the muscles can be restored with a diet containing low (10%) and moderate (35%) fats consumed after exercise, it was found that a medium-fat diet was sufficient. It is also mentioned that high-fat diet increases the amount of fat in skeletal muscles and causes insulin resistance (Bachmann, 2001).

1.1.1.5. Proteins

Organic elements consisting of amine group (NH_2) and of a group of carboxyl groups (COOH) called the radical group (R) which determine the type of amino acids are called amino acids. In plants, NH_2 consisting of organic inorganic nitrogen, carbon dioxide (CO_2) and water combine to form amino acids, and proteins are formed by binding of carboxyl ends of amino acids with peptide bonds of amine groups (Baysal, 2009). The importance of proteins for athletes has been studied for a long time. Their participation in the structure of muscles further increases the value of proteins. In the report titled 'protein and exercise' published by ISSN for the first time in 2007, it was stated that the amount of protein that athletes need to consume should be more than 0.8-1.0 g/kg/day, which is the amount recommended for healthy individuals, but the upper limit to be consumed for this (2.0 g/kg/day) was also added to the report. In addition to the protein consumption amount, the relation of the protein quality, timing of the protein amount to be consumed, and branched chain amino acids (BCAA) to exercise are also discussed in the same report (Campbell et al., 2007). As for the effect of protein consumption on exercise performance, it should be noted that this should be evaluated according to exercise types. At the end of the studies in which high

protein/low carbohydrate diet in athletes, who perform endurance exercise, was observed; it was stated that the endurance performance of those who consume more than 1.5 g/kg/day protein does not increase; contrarily it can even decrease. In addition, it is stated that the protein consumed together with carbohydrates during training does not improve performance, but it may lead to decreased creatine kinase value, which is an indicator of muscle protein damage. Besides not having an ergogenic effect, it is stated that, with this decrease in creatine kinase value, consumption of 0.25 g/kg protein during training can reduce muscle pain.

As a result, if the carbohydrate consumption of athletes who do endurance exercise is sufficient, extra protein consumption for a few days or weeks does not lead to improved performance. In addition, protein consumption during or after exercise reduces muscle damage and pain (Jäger et al., 2017). In a meta-analysis study conducted, it is mentioned that protein consumption has little effect in terms of strength in the weeks to come if individuals who do not train are included in the study, but the effect may be more pronounced as the duration, intensity, and volume of the exercise increases (Pasiakos et al., 2015). In another meta-analysis study, it was stated that protein consumption before and after exercise affects growth and strengthening (hypertrophy) of muscle fibers. Since an anabolic effect cannot be created through only exercise or only nutrition, the exercise program and nutrition program must be in harmony with each other in order to observe the anabolic effect. It is stated that whey proteins, which are milk proteins, are more effective in muscle protein synthesis than casein is, and it is stated that, if protein is consumed 2 hours before or after exercise, protein synthesis in muscle and mitochondria is more effective, and that it also affects glycogen synthesis. Many studies have shown that the protein consumed after exercise positively increases the protein balance in muscles (Campbell et al., 2007). It has been recognized that protein consumption stimulates potency and hypertrophy regardless of its timing. Eventually, muscle protein synthesis may increase with a meal containing essential amino acids, and it is stated that the protein consumed within 4 hours after training will increase muscle protein synthesis by increasing the essential amino acid content in the blood and will continue to have this effect while at rest, too. Muscle synthesis does not occur while hungry. Another fact shown by the studies is that the

muscles are more sensitive to hypertrophy within 24 hours after training and this should be taken into consideration in protein consumption. The amount of protein that should be consumed daily by healthy individuals is 0.8-1.0 g/kg. The daily protein intake recommended for athletes varies depending on the duration and intensity of the exercise and is stated to be 1.4-2.0 g/kg. It is stated that consuming 0.25 g/kg or 20-40 grams of protein may be helpful in increasing muscle protein synthesis after resistance exercise, and that consuming more than 70 grams of protein decreases muscle protein breakdown (Jäger et al., 2017). Leucine, isoleucine and valine, which are branched-chain amino acids, have important roles in protein metabolism, neural functions, blood glucose and regulation of insulin. BCAAs taken orally are important components in muscle protein synthesis as they appear in the blood quickly and their amount increases in the muscles. It is also stated that consumption of leucine between meals alone increases protein synthesis. Protein sources with high essential amino acid content are considered to be quality protein sources. It is stated that consuming 6-15 grams of essential amino acids or consuming 1-3 grams of leucine, one of the branched chain amino acids, after exercise is more effective in stimulating muscle protein synthesis, and it is reported that muscle protein synthesis stimulation will be higher by consuming a protein mixture of leucine/branched chain amino acid. It is also stated that muscle protein synthesis may be permanent in the event of consuming more essential amino acids than the amount of leucine consumed (Jäger et al., 2017; Williams, 2005). It is known that proteins of animal origin are more valuable for athletes because of their essential amino acid content, and it is stated that whey proteins, which are milk proteins, improve training adaptation. Athlete's products usually contain 70-80% protein, while isolated products can contain 90% protein. When choosing protein sources for athletes, needs and contents should be considered (Jäger et al., 2017). It is stated in many studies that protein consumption of athletes must be above 0.8-1.0 g/kg/day which is the recommended amount for healthy individuals, and even that consuming protein up to 2.5-3.3 g/kg/day for training individuals engaged in resistance training does not have a negative effect on blood lipid profile, liver or kidney (Jäger et al., 2017; Williams, 2005).

1.1.1.6. Vitamins

Vitamins are micronutrients that help create energy in the body, along with minerals. They are divided into 2 groups depending on whether they dissolve in water or fat. Fat-soluble vitamins are vitamins A, D, E and K. Since they dissolve in fat, they can be stored in the body and when in excess, they can have toxic effect. Water-soluble vitamins are group B vitamins, choline, carnitine and vitamin C. They are not stored in the body, excess of them is excreted via urine, and toxicity is observed if there is a high rate of supplement intake in addition to daily diet (Ersoy, 2013).

Vitamin A

Molecules with vitamin A activity are present in animal tissues in form of retinoids (retinol, hydroretinol, retinal and retinoic acids), while in form of carotenoids in vegetable tissues. Vitamin A is effective in maintaining the integrity of epithelial tissue in the body, in the growth and health of bones and teeth, in visual functions, in growth, and development of resistance against diseases. While the amount of vitamin A that should be consumed daily for healthy men between the ages of 19-50 is 900 µg(microgram)/ day, it is specified to be 700 µg/day in healthy women between the ages of 19-50. The tolerable upper limit is stated to be 3000 µg/day for both groups (Ross, 2011). In addition to its functions in the body, vitamin A is important for athletes also because it joins in the structure of ferritin and ceruloplasmin, which carry iron and copper minerals in the body. With its antioxidant properties, it is among the vitamins that stand out for athletes. For this reason, it should be taken by the athletes in sufficient amounts with foods. While zinc is needed so that the vitamin A can be used in the body, if it is taken at the level of megadose, it can compete with vitamin D, decreasing its usefulness (Sirota, 1991).

Vitamin D

Vitamin D is scarce in natural foods other than fish oil. It is stated that vitamin D precursors are activated by sunbathing. Vitamin D is active in bone metabolism by increasing calcium absorption from the intestines, carrying calcium from the bones and kidneys to the blood and ensuring the reabsorption of calcium from the kidneys, and plays an active role in preventing bone diseases such as rickets and osteomalacia. In addition, it is stated that, if the vitamin D levels in the blood are normal in cases such as cancer, cardiovascular diseases, psoriasis, multiple sclerosis, type 1 diabetes, a decrease in the formation of diseases is observed (Baysal, 2009). The amount of vitamin D that should be consumed daily by healthy men and healthy women between the ages of 19-50 is stated to be 15 µg/day. It is mentioned that if 100 µg/day is taken, it creates a toxic effect in both groups (Ross, 2011). Considering the vitamin D'swide range of functions in the body, its importance for athletes should not be overlooked. Many studies have demonstrated that vitamin D is effective in preventing injury, rehabilitating, improving neuromuscular functions, reducing inflammation, and reducing fracture risk. In addition, it is stated that it is effective in preventing acute respiratory infections and helping athletes better adapt to training when the vitamin D level in blood is normal. In the report published in 2016 by American College of Sports Medicine (ACSM), it is stated that athletes reach optimal exercise level, their stress fractures are reduced and their adaptation to training improves when the levels of vitamin D in the blood are between 80 nmol/L (32 ng/ml) and 100-125 nmol/L (40-50 ng/ml) (Thomas, 2016). In a study conducted on elite footballers (n:23), a significant decrease was observed in the winter months compared to the end of the summer season, when the serum vitamin D values taken in winter and spring were compared at the end of the summer season. It is also stated that 9.1% of athletes had low vitamin D levels at the end of summer season, 32% in winter and 28% in spring (Angelini, 2011).

Vitamin E

It is stated that vitamin E (tocopherol) is effective in reproductive health and it is a powerful antioxidant, and that its deficiency causes fatigue in muscles (Baysal, 2009). It is stated that tocopherols prevent inflammation and cancer development due to their antioxidant properties, and they decrease the risk of diabetes, cardiovascular diseases and neurological diseases (Whitney and Rolfes, 2013). The daily need for vitamin E is specified as 15 mg in healthy men and women between the ages of 19 and 50, while the tolerable upper limit is stated to be 1000 mg/day for both groups (Ross, 2011). While high polyunsaturated fatty acid consumption increases the need for vitamin E, if it is consumed in excess, it competes with vitamin K. It is stated that vitamin E will positively affect the performance by protecting the structure of the muscles in athletes exercising above sea level, but it is also stated in the studies that it does not affect the endurance of the athletes. It is stated that vitamin E is important for athletes because of its antioxidant effect rather than its effect on endurance, and it has been reported that individuals who exercise should consume 25-50% more vitamin E in addition to daily recommended amount (Zoppi et al., 2006).

Vitamin K

Vitamin K helps the blood to clot. It dissolves in fat, but its water-soluble form is used parenterally (Baysal, 2009). While the amount of vitamin K that should be taken daily is 120 µg/day for healthy male individuals between the ages of 19 and 50, it is specified to be 90 µg/day for healthy women of the same age group, and it is reported that there is no tolerable upper limit (Ross, 2011). The functions of vitamin K in the body can be hindered or increased in the event of interaction with many drugs. Therefore, attention should be paid to consuming it according to the drugs used by healthy individuals and athletes (Baysal, 2009).

Thiamine (Vitamin B1)

While thiamine is involved in protein and fat metabolism, it is mostly active in carbohydrate metabolism. As the amount of carbohydrate consumption increases, the need for thiamine increases as well (Baysal, 2009). The need for thiamine is determined to be 1.2 mg/day in healthy male individuals between the ages of 19-50, while the need in healthy women in the same age group is 1.1 mg/day (Ross, 2011). It is also stated that 0.27-0.33 mg/1000 kcal should be consumed (Baysal, 2009). The need for thiamine is either met or increased as individuals get the energy they need from food (Whitney and Rolfes, 2013). Due to its function in energy metabolism, thiamine is expected to have a performance-enhancing effect in athletes, but studies have concluded that thiamine supplementation will have no effect on athletes' performances (Darin, 2008).

Riboflavin (Vitamin B2)

Riboflavin is involved in many reactions as a coenzyme in energy metabolism (Baysal, 2009). Riboflavin need is specified to be 1.3 mg/day in healthy male individuals between the ages of 19-50, while it is stated to be 1.1 mg/day in healthy women in the same age range (Ross, 2011). It is also stated that 0.25-0.27 mg/1000 calories are needed (Baysal, 2009) As individuals obtain the energy they need from food, thiamine need is either met or it is consumed more than necessary (Whitney and Rolfes, 2013). If there is a deficiency in dietary intake, riboflavin supplement yields positive results, however its use as a supplement in athletes has no effect on physical performance, oxygen capacity or strength development. No extra supplement is required for athletes if riboflavin is taken at the required level with foods (Kristen et al., 2008)

Niacin (Vitamin B3)

Niacin acts as a coenzyme in metabolism in form of Nicotinamide Adenine Dinucleotide (NAD) and Nicotinamide Adenine Dinucleotide Phosphate (NADP). These two coenzymes are very important in the metabolism of carbohydrate, protein and alcohol in the energy mechanism (Baysal, 2009). It is stated that healthy men aged 19-50 need 16 mg/day of Niacin while women in the same age group need 14 mg/day (Ross, 2011). It is also reported that 6.7 mg kcal is needed for 1000 kcal of energy taken in. Consuming good quality protein decreases the need for niacin (Baysal, 2009). Due to these functions of NAD and NADP in energy metabolism, it can be thought that the supplements would increase the aerobic performance of the athletes, but studies conducted have not reached such result. Still, since athletes need more energy and little niacin intake will cause disruptions in the energy metabolism, athletes must also meet the recommended daily need (Kristen et al., 2008).

Pantothenic acid (Vitamin B5)

Pantothenic acid plays an essential role in energy metabolism as it carries acetyl groups in the metabolism of carbohydrates, proteins and fats. It is also involved in the synthesis of cholesterol, vitamin A, vitamin D and steroid hormones in the nervous system (Baysal, 2009). The daily need for pantothenic acid intake in healthy individuals between the ages of 19-50 is 5 mg. It is stated that there is no tolerable upper limit (Ross, 2011). In case of deficiency, muscle contraction, increased heart rate, gastrointestinal system disorders, growth retardations and stillbirths can be seen (Baysal, 2009). Although there aren't many studies conducted on athletes in this sense, it has been stated that 2 g/day pantothenic acid supplementation for 2 weeks reduces blood lactate level and oxygen consumption. In studies it’s conducted that Pantothenic acid did not reach a positive effect, it is stated that the amount that should be consumed daily for athletes should not be less than the amount recommended for healthy individuals (Mikael, 2000).

Vitamin B6

Vitamin B6 is involved in more than 100 reactions in the body. Although these reactions are mostly related to amino acid metabolism, they also show activity in carbohydrate and fatty acid metabolism (Whitney and Rolfes, 2013). The vitamin B6 requirement for healthy male and female individuals between the ages of 19-50 is specified to be 1.3 mg/day (Ross, 2011). It is also stated that 0.016 mg/d protein should be consumed depending on protein intake, due to the role of vitamin B6 in metabolism (Baysal, 2009). Studies on vitamin B6 indicate that the use of supplements, ie, consuming more than the recommended daily amount, does not improve aerobic performance or strength (Kristen et al., 2008; Whitney and Rolfes, 2013).

Biotin (vitamin B7)

Biotin (vitamin B7) is involved in the synthesis of fatty acids, gluconeogenesis and leucine metabolism (Kristen et al., 2008). The recommended daily intake for healthy men and women between the ages of 19-50 is 30 µg/day (Ross, 2011). The link between performance and biotin in athletes has not been studied (Kristen et al., 2008).

Folic acid (Vitamin B9, Folate)

Folic acid is involved in many metabolic reactions such as proliferation of blood cells, formation of antibodies in the immune system, cell proliferation, DNA synthesis in fast growing cells, and methionine synthesis from homocysteine (Baysal,2009; Whitney and Rolfes, 2013). Folic acid requirement is stated to be 400 µg/day for healthy men and women between the ages of 19-50. In addition, taking

1000 µg/day creates a toxic effect in healthy individuals between the ages of 19-50 (Ross, 2011). Growth retardation, reproductive disorders and megaloblastic anemia are observed in case of folic acid deficiency (Baysal, 2009). In the studies conducted, it was examined whether folic acid supplement may have an effect on performance, considering its role in erythrocytes, but there was no increase in blood levels resulting from the supplementation, and so it was concluded that it had no effect on performance. However, it is stated that the condition of the folate in the cell should be evaluated with the studies to be conducted (Kristen et al., 2008; Mikael, 2000). The amount of folic acid recommended for athletes is accepted to be the same amount recommended for healthy individuals (Kristen et al., 2008).

Vitamin B12 (Cobalamin)

Vitamin B12 shows activity in fat, carbohydrate and protein synthesis metabolism (Kristen et al., 2008). It shows activity in normal red blood cell formation and in the nervous system (Mikael, 2000) . Vitamin B12 need of men and women between the ages of 19-50 is specified to be 2.4 µg/day (Ross, 2011). In the studies conducted on athletes, it was concluded from the study that normal blood values were reached with the use of supplements in individuals with deficiencies, but there was no improvement in exercise performance. Although B12 supplementation does not affect performance, daily intake must meet the recommended amount for healthy individuals (Kristen et al., 2008; Mikael, 2000).

Choline

Since choline is involved in the structure of phospholipids, it helps with transport and metabolism of lipids (Baysal, 2009). Choline has a lot of functions in metabolism as it is methyl carrier and donor. It plays a role in ensuring genomic stabilization and in the nervous system. It also has antioxidant effects, and its

inadequate intake leads to oxidative stress and apoptosis in cells (Whitney and Rolfes, 2013). While the recommended daily intake of choline for healthy male individuals between the ages of 19-50 is 550 mg/day, this value is 425 mg/day for women of the same age group. It is reported that consumption of 3.5 g/day of choline will be toxic in both groups (Ross, 2011). It is noted that choline supplementation does not improve endurance performance, but in case of deficiency, choline is made available in the body with choline supplements (Chris, 2008).

Carnitine

Carnitine is also called the vitamin BT. There is no daily recommended consumption amount or tolerable upper limit specified (Ross, 2011). Carnitine is mostly found in skeletal muscle and heart. Although It is stated that there is no harmful effect in long-term use, 1 or 2 grams of supplement per day has no effect on body composition either but reduces free radicals and tissue damage that occurs after resistance exercise (Tim et al., 2008). It has been reported that the level in muscles does not change with carnitine supplementation, so it does not have any effect on lipid metabolism in muscles either (Serge et al., 2008). Carnitine intake of more than 5 grams per day causes mild gastrointestinal disturbances. Although carnitine use after exercise has some positive effects in the literature, there is no sufficient evidence, and it is stated that more studies should be conducted on the effects of carnitine after or during exercise (Bloomer et al., 2013).

Vitamin C

Vitamin C has many functions in the body. It takes part in the synthesis of collagen protein which holds tissues together in the body. It increases the endurance of capillary blood vessels. It protects the body from infection and bacterial toxins. It is an anticancer agent. It takes part in the synthesis of steroid hormones. It affects

absorption of iron, calcium, thiamine, Riboflavin, folic acid, Pantothenic acid and vitamins A and E positively, but its excessive consumption affects the absorption of vitamin B12 in the stomach negatively. The need for it increases under stress and in smokers Mikael, 2000). While the vitamin C needed by healthy male individuals between the ages of 19-50 is specified to be 90 mg per day, this value is 75 mg for women of the same age group. Consuming 2000 mg of vitamin C per day creates a toxic effect (Ross, 2011). It is also stated that smokers should take 2 times more vitamin C than non-smokers (Baysal, 2009).

Vitamin C supplementation does not contribute to an increase in aerobic capacity or an increase in lactate threshold (Mikael, 2000). It is stated that, with the vitamin C supplementation, improvement in the immune system of athletes is observed just like in that of healthy individuals. However, it should be acknowledged that this effect occurs as a result of intense exercises. Although it is stated that the use of supplements delays the fatigue in the muscles, the effects are not evidence-level. It is stated that high amounts of supplement can create oxidant elements, therefore the supplementation should not exceed the recommended daily amount (Darin et al., 2008). The effect of vitamin C on athletes is studied mostly with its antioxidant properties in mind. In this context, there are studies in the literature where vitamins A, C and E, which are antioxidant vitamins, are studied together. In a study conducted to understand the effect of vitamins C and E on oxidative stress, muscle damage and performance, 10 young footballers were divided into 2 groups. Both groups performed the same type of training and while one group was given vitamin C and E supplements during a 3-month camp period before the season, the other group was given placebo for the same duration and same exercise program. At the end of the preparatory period after intensive exercises, a decrease in muscle damage and lipid peroxidation was observed in the experimental group, while no difference was observed in the placebo group (Zoppi et al., 2006). In the study conducted with 26 male and 34 female rowing athletes, 7-day food consumption records of the participants were gathered and a questionnaire on total antioxidant consumption was administered. The study found that exercise has more effect on total antioxidant capacity than vegetable consumption, and vitamin A and vitamin C intake (Braakhuis et al., 2013). It is stated that supplementation of antioxidant elements may be used in intensive exercises or when

there is not enough time to recover in between exercises. It is also stated that the daily recommended consumption amounts of vitamin C and E can be doubled, and if this value is reached with nutrients, other antioxidant elements will also be more than enough, and therefore negative effects of oxidant elements can be prevented, however, it is suggested that the published reports should be more personal (Neubauer et al., 2015).

1.1.1.7 Minerals

About 4-5% of the human body is composed of minerals. Minerals are essential for maintaining acid-base balance in the body, regulating osmotic pressure, ensuring membrane passage, and for functional nervous and muscular systems (Baysal,2009; Kristen et al., 2008). Their functions and importance for athletes;

Sodium, Potassium and Chlorine

Sodium and potassium are necessary for ensuring the acid-base balance in the body and for osmotic pressure. While sodium is present in foods usually with chlorine (table salt), both sodium and potassium bind with chlorine, bicarbonate and phosphate to keep the blood neutral. Adequate amount of sodium and potassium in the body is also necessary in terms of muscle contraction and nerve conduction (Baysal,2009; Kristen et al., 2008). While it is considered sufficient to consume 1.5 g/day sodium for healthy individuals between the ages of 19-50, this value is specified to be 4.7 g/day for potassium. While consuming sodium more than 2300 mg per day creates a toxic effect, no tolerable upper limit values for potassium have been determined. The state of chlorine proceeds in parallel with potassium in the body. In case of potassium deficiency, chlorine deficiency is also observed in the body and osmotic pressure is disturbed (Baysal,2009; Whitney and Rolfes, 2013). It is stated that the daily need for chlorine should be 2.3 g and the tolerable upper limit level is reported to be 3.6 g/day. (Ross, 2011). Excessive consumption of sodium results in health problems such as edema in the body and hypertension. In its deficiency, symptoms such as vomiting,

confusion, muscle fatigue, pain and respiratory failure occur. In case of insufficient intake of potassium, muscle fatigue, disturbed heart rate and respiratory failure are observed due to a decrease in glycogen stores (Baysal, 2009). Sodium and potassium are excreted from the body via sweating, feces, urine and secretions, and these values are taken into account in determining the daily need. Athletes experience more fluid loss due to exercise, so loss of minerals such as sodium and potassium also increases. In addition, factors such as high temperature, intensity and duration of exercise affect the rate of sweating and may require nutritional intervention. It is aimed to minimize fluid losses through the excretory system by making use of the water retention (edema) feature of sodium (Kristen et al., 2008). Sodium preserves blood volume and also causes a desire to consume fluid. Maintaining blood density is important for the performance of athletes. Due to sodium losses, athletes need to consume approximately 1.5 times the amount recommended for healthy individuals (Tuber, 2015).

Calcium

Calcium is a mineral, 99% of which is in the structure of bones and teeth and has a storage of 1000-1200 g in an adult. Calcium is an essential mineral for blood clotting, the transport of the cell membrane, nerve conduction and heartbeat (Baysal, 2009). Vitamin D, calcitonin, and parathyroid hormone (PTH) are necessary for the balance of calcium in the blood (Kristen et al., 2008). The daily amount of calcium needed by individuals aged 19-50 is 1000 milligrams. The tolerable upper limit of individuals in the same age group is 2500 mg/day (Ross, 2011). Calcium consumed in high amounts is associated with weight loss in obese (Zemel et al., 2004). Calcium supplementation may be useful in case of calorie restriction (Kristen et al., 2008). Inadequate intake of calcium via nutrition increases stress fractures (Thomas et al., 2016). It is also stated that calcium need is higher in younger female and male athletes than it is in healthy individuals. This value is stated to be 1200 mg/day for young athletes (Tuber, 2015).

Phosphorus

Phosphorus is the second most abundant mineral in the human body after calcium. 80% of phosphorus is found in the structure of bones and teeth in the body, bound to calcium. Apart from being involved in the structure of bones and teeth, phosphorus takes part in very important metabolic events such as being the main component of nucleic acids, forming the basic structure of the cell membrane as phospholipids, enabling the introduction of carbohydrates into energy metabolism (phosphorylation), joining in the structure of energy sources required for muscle contraction such as adenosine triphosphate (ATP) and Creatine-P, and maintaining the acid - base balance (Baysal, 2009). 19-50 The amount of phosphorus required for healthy individuals between the ages of 19 and 50 is 700 mg/day. The tolerable upper limit for healthy individuals in the same age range is stated to be 4000 mg (Ross, 2011). The importance of phosphorus is acknowledged for its role in metabolism. Endurance athletes were given excessive phosphorus for 7 days and an increase was observed in plasma phosphate and erythrocytes, however it was not examined whether this increase had an effect on endurance performance (Bremner et al., 2002) Still, it is stated that this increase may improve performance and more studies need to be conducted (Kristen et al., 2008).

Magnesium

60% of magnesium in the body is found in bones and teeth, 26% of it is in muscles and the rest is in soft tissues and body fluids. Magnesium in body fluids regulates osmotic pressure, helps maintain acid-base balance, it is active in the muscular and nervous system, and it helps muscles relax after calcium, which enables muscle contraction. Magnesium is required in phosphorus addition reactions in energy metabolism. It helps regulate blood pressure and correct glucose tolerance (Baysal,2009; Whitney and Rolfes, 2013). The amount of magnesium that healthy men

in the 19-30 age group should consume daily is 400 mg, while the amount of magnesium that healthy women in the 19-30 age group should consume daily is 310 mg (Ross, 2011). It is stated that, as a toxic effect, it can cause diarrhea and dehydration may develop due to this (Whitney and Rolfes, 2013). It is stated by ISSN that 500 mg/day magnesium supplementation does not affect the performance of athletes unless there is a deficiency (Kreider et al., 2010).

Iron

60% of the iron in an adult's body is found in the blood and the majority of the amount in the blood is in the structure of haemoglobin, which helps carry oxygen. Some iron is also found in the structure of haemoglobin and myoglobin in the muscles. Iron's role in the transport of oxygen is its most important feature. In this way, oxygen plays a role in ATP production by combining with hydrogen in metabolism. Iron is also essential for the immune system and cognitive performance (Baysal, 2009). With its role in oxidation-reduction reactions, it becomes essential in amino acid production in the cell, and in collagen, hormone and neurotransmitter synthesis (Whitney and Rolfes, 2013). The recommended daily iron intake amount is 8 mg for healthy men aged 19-50, and the amount recommended for women of the same age group is 18 mg/day. 45 mg/day is indicated as tolerable upper limit (Ross, 2011). Iron is present in the form of non-hem iron in herbal tissues and the absorption of this type of iron is lower than that of the hem iron form in animal-origin foods. Iron deficiency anaemia characterized by decreased blood cell and haemoglobin count is observed in case of its deficiency. In the case of anaemia, the oxygen carrying capacity of the blood decreases and dizziness, fatigue, loss of appetite, dysfunction in the digestive system, difficulty breathing, insufficiency in the immune system, decreased work performance and reduced cognitive functions are observed (Baysal,2009; Whitney and Rolfes, 2013). Iron deficiency is seen in athletes as well and it is stated that it causes red blood cells to clot, decreasing the fluidity of the blood. Even if there is no anaemia, iron deficiency affects performance negatively in athletes with a decrease in muscle function and working capacity. Its deficiency is associated with insufficient

consumption of hem iron resources or insufficient energy intake. Due to this, it is stated that the iron in athletes should be checked regularly (Connes et al.,2013; Thomas et al., 2016). Although there are conflicting results from the studies in which iron resources were increased through nutrition, it can be said that increasing iron consumption through nutrition can have a positive effect on iron stores. It is stated that the use of supplements is effective in case of deficiency, but more studies need to be conducted on whether supplementation should be done or not if there is no deficiency in the blood (Thomas et al., 2016).

Copper

Copper takes part in iron transport and hemoglobin synthesis. It plays a role in energy systems through many enzymes the structures of which it is involved in. The amount of copper that need to be taken daily for healthy male individuals between the ages of 19-50 is 900 µg, and 900 µg/day for healthy women in the same age range. The tolerable upper limit is stated to be 10000 µg for healthy individuals of the same age group (Ross, 2011). Copper supplementation has no known effect on athletic performance (Kristen et al., 2008).

Iodine

75% of the iodine in the body is found in the thyroid gland and the rest is in blood, milk-secreting mammary glands, gastric mucosa and other tissues. Iodine is present in the structure of triodothyronine (T3) and thyroxine (T4) hormones secreted from the thyroid gland. T3 and T4 hormones, the levels of which is determined through the thyroid stimulating hormone (TSH) secreted from the pituitary gland, affect the basal metabolic rate (Baysal, 2009). The daily requirement of iodine for healthy individuals between the ages of 19-50 is specified to be 150 µg. The tolerable upper limit is reported to be 1100 µg/day (Ross, 2011). Majority of the iodine taken via nutrition is excreted in the urine, but elite athletes who regularly train can lose iodine

by sweating, too. While the number of electrolytes lost by sweating has been well determined in studies conducted, iodine loss has not been determined. It is stated that long-term iodine deficiency has a negative effect on thyroid hormone functions and that iodine deficiency may also negatively affect performance in athletes (Duntas and Smyth, 2005).

Fluorine

Osteoporosis and decrease in bone density are more common in areas where there is not enough fluorine in water. Its main source is water. Therefore, dental cavities due to fluorine deficiency is rare in people (Baysal, 2009). While the daily recommended amount of fluorine for healthy male individuals between the ages of 19-50 is 4 mg/day, this value is specified to be 3 mg/day for healthy women in the same age group. 10 mg/day is indicated as the toxic effect dose for both groups. (Tuber,2015). There is no study on the importance of fluorine in athletes.

Zinc

Due to its support for protein to function, Zinc gene expression plays an important role in many metabolic events containing protein, such as antioxidant effect on cell membrane and DNA, helping growth and development, supporting the immune system, production, synthesis and release of insulin in the pancreas, increasing learning ability, supporting thyroid hormone functions, formation of normal taste sense, sperm production, and fetal development (Baysal,2009; Whitney and Rolfes, 2013). The amount of zinc that should be consumed daily by healthy male individuals between the ages of 19-50 is 11 mg, and for healthy women in the same age group, this value is specified as 8 mg/day. The tolerable upper limit is specified as 40 mg/day (Ross, 2011). It is stated that the recommended daily dose should not be exceeded as excess zinc intake will negatively affect the absorption of copper (Clarkson, 2000). It is also

stated that the immune system may be weakened with high intake of zinc (Ronald et al., 2018).

Chromium

Chromium enhances the effect of insulin, allowing glucose to be used (Whitney and Rolfes, 2013). The daily consumable amount of chromium for healthy men between the ages of 19-50 is 35 µg, while it is 25 µg/day for women in the same age group, and the tolerable upper limit has not been determined (Ross, 2011). The best sources of chromium are stated to be unrefined foods and whole grains. In case of chromium deficiency, insulin secretion decreases, and glucose intolerance may develop (Whitney and Rolfes, 2013). The studies conducted on chromium in athletes found the evidence that supplementation reduces fat tissue insufficient, and it is stated that consuming up to 200 µg/day is harmless, such an effect may occur in individuals with deficiency, but this situation also need to be studied (Clarkson, 2000).

Selenium

Selenium is among the best antioxidants of the body. It works together with vitamin E in the antioxidant system. It is also involved in the structure of thyroid hormone (Whitney and Rolfes, 2013). Daily recommended intake amount of selenium for healthy individuals between the ages of 19-50 is stated to be 55 µg. The tolerable upper limit is reported to be 400 µg/day (Ross, 2011). Although selenium does not have a known effect on athletic performance, it is stated that it may be protective against oxidative damage since it shows antioxidant activity (Kristen et al., 2008). It is also noted that care should be taken not to exceed the recommended upper intake level (Ronald et al., 2018).

1.1.1.8. Fluid

Water covers 60% of our body. All elements in our body except for bones, skin, connective tissue and fats are in the form of solution in body water. Water takes part in digestion, absorption and transport of nutrients, enabling biochemical reactions, functioning of tissue and organ systems, transport and disposal of products resulting from metabolic events, control of body temperature, and joint lubricity (Tuber, 2015). Also, water is highly effective in maintaining cognitive and physical performance. In order for water in the body to perform these important functions, the water balance must be maintained. Maintaining the water balance in the body is defined as hydration. Water is excreted from the body through the respiratory tract, urine, sweat and feces, and is taken with food and drinks. The water decrease in the body is defined as dehydration. As a result of dehydration, water cannot perform its functions in the body (Tuber, 2015). Various methods are used to understand whether the body is hydrated or dehydrated. In order to conclude that these methods are ideal methods, they need to be sensitive to changes of about 3% in total body water. Total body water, plasma osmolarity, urine specific gravity, urine osmolarity and body weight methods are methods used to determine hydration status. The best result is achieved when plasma osmolarity and total body water are evaluated together. The method of weighing after getting up and urinating in the morning also contains a low margin of error for the degree of hydration with urine concentration. Monitoring the biomolecules in urine also helps to determine whether individuals are hydrated or dehydrated (Sawka et al., 2007). Body weight measurement method is the easiest method to determine the effective and dehydration in the period during which athletes are well hydrated and get sufficient energy. If the athletes are in the specified conditions, the daily differences observed between the weights after waking up and urinating are less than 1%. Ifthese measurements are taken for at least 3 consecutive days, a baseline data is obtained and compared to the weight information obtained from the weigh-in to be done after training. According to the results of comparison, every 1 gram of weight loss is equal to 1-1.5ml of fluid loss. It is stated that the method of measuring weight with accurate and precise measurements is quite sensitive to acute changes in total body fluid. Water is the best ergogenic supplement for athletes. Loss of fluid up to 2% of body weight

significantly affects exercise performance. And when this loss goes up to 4%, heat stroke and death can occur. The sweating rate of the athletes varies from 0.5 to 2 liters per hour depending on the temperature and amount of moisture of the exercise environment, the intensity of the exercise and the genetic differences (Maughan and Noakes, 1991).

Athletes should not wait until they feel thirsty to drink water, and they should train themselves to drink more water during exercise because the most effective way to prevent dehydration is to take fluid during exercise (Kreider et al., 2010). Drinks drunk before, during and after exercise are called sports drinks. Fluid consumption prior to exercise should be started a few hours before exercise. In this way, there will be sufficient time for the consumed liquid to leave the body. In addition, if there is sodium in the content of the consumed liquid or if it is consumed together with salty snacks, liquid's duration of staying in body will be lengthened. The main purpose of fluid intake during exercise is to lose no more than 2% of weight and maintain electrolyte balance in order to avoid hyponatremia, heat stroke and negative effects on performance (Sawka et al., 2007). If electrolytes such as sodium and chlorine, which are lost with the fluid during exercise, are not replaced, a health problem called water poisoning or hyponatremia, which may result in death, may occur (Garigan and Ristedt, 1999).

The fluid needs of athletes should be determined individually, and for this, it is necessary to know the amount of fluid lost during training. If the time after the exercise is sufficient, the athletes will become hydrated with their normal diet and fluid consumption habits. If the time is limited, they must consume 1 to 1.5 liters of fluid per 1 kilogram of weight lost (Sawka et al., 2007). It is stated that sports drinks should contain approximately 20-30 mEq/L sodium (together with chlorine), 2-5 mEq/L potassium, and carbohydrates in the range of 5-10% (Marriot, 1994). The fact that carbohydrates are the main source of energy for exercise, and the necessity of replacing the fluid and electrolytes lost by sweating during exercise has brought with it the emergence of the sports drink industry. The main purpose of sports drinks is to increase fluid absorption, to provide carbohydrates to be used during exercise, and help

recovery after exercise. Other ingredients in sports drinks are vitamins and minerals. Sports drinks can be hypertonic, isotonic or hypotonic. Most drinks are isotonic. In this way, it is aimed to accelerate digestion and absorption (Galaz, 2013). Energy drinks can have a positive effect on performance due to the carbohydrate and caffeine they contain, but the amount of carbohydrate they contain may be more than the recommended range for athletes. The caffeine's effects on mental and physical performance are known, but the amount of caffeine in drinks may be higher than the recommended amounts. Also, it is not known how the other substances added to energy drinks in addition to caffeine and carbohydrates will affect athletes (Campbell et al., 2013).

1.1.1.9. Weight Control

The performances of athletes may depend on their body composition according to the branch in which they do sports. Having the recommended body composition specific to their sports branch will reflect positively on their performance (Manore, 2000). Bringing the body fat rate to sports-specific recommended values is the main target in weight control of athletes. While Body Mass Index helps classify healthy individuals as underweight and overweight; in case of athletes, the desired body compositions are determined instead of such classification (Sundgot Borgen, 2013).

For athletes whose body fat ratio is higher than the desired one, calorie restrictions may be implemented in order to enable rapid weight loss; however, such practice should not be implemented for athletes with low body fat ratio. Weight loss goals of athletes should be 0.7 percent or 0.5 to 1.0 percent of their body weight. It is stated that the muscle tissue is preserved if the protein consumption of the athletes is more than the recommended (1.4-2.0 g/kg) amount during this practice of calorie restriction. It is also reported that it would be correct to regulate the training programs of athletes and increase the amount of protein by exceeding the recommended ranges in order to preserve the muscle mass, instead of calorie restriction (Aragon et al., 2017). The syndrome, which consists of interconnected conditions in physically active

women and female athletes, is called female athlete triad. Components of the syndrome are energy availability, menstrual cycle disorder and low bone-mineral density related or not related to eating behavior disorder. In the previous studies, it was called the female athlete triad when these 3 components are observed together; however now, if 2 of the 3 components are observed together, it is considered within the triad, too (De Souza et al., 2017). Energy availability is the energy left for body functions after exercise. If this energy is insufficient, the body reduces its activities in cellular events, thermoregulation, growth and reproductive systems through physiological mechanisms. Vital functions can continue with low energy available, but health is negatively affected. Athletes restrict their available energy by increasing their energy expenditure or reducing their energy intake. It also leads to develop eating behavior disorders such as prolonged hunger, night eating syndrome, and laxative use. Eating behavior disorders are more common in aesthetic sports, sports with weight classification and sports requiring endurance (Nattiv et al., 2007).

1.1.1.10 Ergogenic Aids and Effects on Performance

The use of ergogenic aids is encouraged by impressive advertisements and communication of experiences by acquaintances, as well as its enhancing effect on athletic performance. However, the fact that ergogenic support products is an industry and a trade can cause athletes to abuse because of advertising and other means. The prevalence of ergogenic aids among elite and veteran athletes ranges between 37-89%. Although some of the athletes get their ergogenic support advice from dieticians and other healthcare professionals, the majority of them get information from family, friends, teammates, the internet and sellers (Murray, 2000). In the ISSN report (2010), they are grouped as the ones which can help build muscle (creatine, protein, essential amino acids, hydroxymethyl butyrate and branched chain amino acids), the ones which can help with weight loss (low-calorie foods, caffeine, high-fiber diet, calcium, green tea extract, and conjugated linoleic acid), and the ones which may have an effect on performance improvement (water, sports drink, carbohydrate, creatine, sodium phosphate, sodium bicarbonate, caffeine, beta alanin, post-workout carbohydrate+

protein, essential amino acids, branched chain amino acids, hydroxymethyl butyrate and glycerol) (Kreider et al., 2010). In the report of the International Olympic Committee (IOC) (2018), ergogenic aids, which may be useful for athletes when used for specific purposes, are also stated. Aids that improve the performance of athletes when used properly are listed as caffeine, creatine, nitrate, beta-alanine and sodium bicarbonate. Aids that can be helpful in exercise capacity, recovery, muscle pain and injuries are specified as creatine monohydrate, beta-hydroxy betamethyl butyrate, omega-3 fatty acids and vitamin D. Apart from these, it is stated that more research should be done about gelatin and vitamin C/collagen composition and anti-inflammatory nutritional supplements. Aids that help weight loss or gain are listed as protein and leucine. Apart from these, it is stated that more research should be done on whether green tea, pyruvate, chromium, α-lipoic acid, conjugated linoleic acid, omega-3 fatty acids and chitosan have an effect on weight control (Ronald et al., 2018).

Caffeine

Caffeine works by increasing neuromuscular functions, increasing alertness, and reducing effort during exercise. It is reported that consuming 3-6 mg/kg or less than 3mg/kg, approximately 200 mg, in the form of powder or pill before training will affect performance. (Ronald et al., 2018) Studies show that caffeine does not cause diuretic effect or any change in the body's fluid balance to the extend which directly affects athlete's performance (Goldstein et al., 2010). Consumption of 3-6 mg of caffeine in the form of powder or pill approximately 60 minutes before exercise or consumption of less than 3 g/kg, approximately 200 milligrams, before or during exercise together with carbohydrate sources, is stated as a support protocol (Ronald et al., 2018).

Creatine

It is reported that taking 20 g/day creatine with or taking immediately after a meal containing 50 grams of protein and carbohydrates for 4 days creates a significant increase in lean body tissue and muscle strength. It is said that it will increase the maximum force while performing repetitive movements in high-intensity exercises and very short-term movements (<30sec). It is said that it increases muscle strength and force. It is stated that this in turn contributes to the prevention of injuries. It is also stated that, although somewhat, it increases endurance, increases protein synthesis, increases glycogen stores and facilitates thermoregulation. The form of monohydrate has been reported to be more effective for creatine support (Kreider et al., 2017; Ronald et al., 2018). Considering that hundreds of studies have been carried out on creatine, it is reported that short and long-term support is not harmful and that consumption of up to 3 g daily will not be harmful throughout life (Kreider et al., 2017).

Nitrate

It is reported that with the nitrate, taken into the body via consumption of green leafy and root vegetables containing high nitrate, can be beneficial for performance in prolonged exercises, and it has a performance enhancing effect as it affects muscle fibers and increases the flow rate of blood coming to the muscles. It is stated that it starts to affect performance 2-3 hours after consuming 5-9 mmol, i.e about 310-560 grams, of nutritional source, and its positive effect continues if these amounts are consumed for 3 days. It is also stated that the nitrate support increases the time until fatigue by 25% (Ronald et al., 2018).

Beta Alanine

It is stated that a total of 65 mg/kg Beta-alanine supplementation in every 3-4 hours for 10-12 weeks creates a buffering (acidity regulating) effect in the cell by increasing the level of carnosine in the muscles (Ronald et al., 2018). According to ISSN, 4-6 g/day supplementation for 4 weeks has a buffering effect, too. When 4-6 grams of supplement is given, it is reported that it will positively affect performance in 1-4 minutes of timed or tasked exercises. It is mentioned that the use of beta-alanine with other supplements may have a better effect (Trexler et al., 2015).

Sodium bicarbonate

Sodium bicarbonate increases performance by acting as an extracellular buffer in high-intensity exercises. It is stated that it shows its effect if 0.2-0.4 mg/kg is consumed 60-150 minutes before the exercise, and that taking the same amounts in small doses will have the same effect. It is reported that it decreases the effort exerted in exercise types that last longer than 10 minutes with sprint performance lasting approximately 1 minute (Ronald et al., 2018). It is stated that if the supplement, which is taken 5 grams twice a day, is taken for 5 days, it creates a buffering effect in high-intensity exercises, however these doses may cause gastrointestinal disturbances and therefore it may be more appropriate to consume them in small doses (Kreider et al., 2010).

Beta-hydroxy betamethyl butyrate (HMB)

It is stated that beta-hydroxy betamethyl butyrate increases adaptation to exercise, by decreasing protein breakdown and increasing its synthesis as well as increasing growth hormone synthesis (Ronald et al., 2018). If HMB, which is a

metabolite of leucine amino acid, is taken in 1.5-3 grams per day, it creates a significant increase in the muscle mass of individuals who are new to exercise and in that of elderly people. It is stated that this effect is around 0.5-1.0 kg in the exercises lasting 3-6 weeks compared to the groups without HMB intake. In studies related to muscle mass increase in athletes, it is stated that it increases muscle mass, although not significantly (Kreider et al., 2010).

Omega-3 fatty acids

It is stated that omega-3 fatty acids increase adaptation by affecting cognitive performance and help recovering after training. The studies conducted show that it is possible to improve memory with the support of omega-3 fatty acids in the elderly with moderate or severe mental disorders. However, it is not clear whether this effect will occur in young and healthy individuals and athletes (Ronald et al., 2018). Still, it should be taken into consideration that omega-3 fatty acids are necessary for normal growth, visual activity and cognitive development (Whitney and Rolfes, 2013).

1.1.2. Eating Disorders

It is seen that physical appearance has an important place in people's lives and as a result, the prevalence of eating disorders increases. For example; 0.3-9% of the adolescent and young population in the United States is diagnosed with anorexia nervosa, 0.5-5% is diagnosed with bulimia nervosa, 1.6-3.5% is binge eating disorder and about 4.0% are diagnosed with unidentified eating disorders (Le Grange et al., 2012). Although the primary purpose of eating is nutrition, today, cultural, biological, and psychological factors, as well as rapid changes in eating attitudes are observed. Eating disorders are a group of diseases that occur as a result of the interaction of these factors, having both mental and physical dimensions, and can lead to serious

complications and death as a result of inadequate or excessive food consumption. Eating disorders are also considered to be all of the common, chronic and debilitating conditions that adversely affect a person's quality of life (Fairburn and Harrison, 2003).

In another definition, eating disorders are characterized by serious disorders in eating behaviour or eating-related behaviours that significantly damages physical and psychosocial health and result in a change in consumption and absorption of the food (American Psychiatric Association, 2013). Anorexia nervosa and bulimia nervosa constitute a significant part in psychological diseases, and it becomes a serious public health issue, especially in the Western world (Martinsen et al., 2010). Eating disorders are common psychiatric disorders, especially in middle-income individuals, in the white race, and in industrialized societies, where attractiveness is thought to be related with being thin (Houtkooper, 2000; Toker and Hocaoğlu, 2009). Eating disorders are more common than expected, affecting not only young and middle-aged women but also young and middle-aged men, even children (Ercan, 2016). Until today, the psychopathological features of eating disorders have undergone some changes in terms of diagnosis and classification. The diagnosis of eating disorders was included in DSM as a sub-category for the first time in 1980 (American Psychiatric Association, 1994). In DSM-IV, it is defined in two different ways as nutrition-eating disorders and eating disorders of infants or young children. With the latest update, all definitions of eating disorders are classified in DSM-V under the title of nutrition and eating disorders (American Psychiatric Association, 2013)

1.1.2.1. Classification of Eating Disorders

A classification scheme has been established in the DSM-V criteria for pica, rumination disorder, avoidant / restricted food intake disorder, anorexia nervosa, bulimia nervosa and binge eating disorder (American Psychiatric Association, 2013). On the other hand, obesity was not included in DSM-V as a mental disorder since it is caused by a long-term excess of energy intake versus energy consumption.

1.1.2.2. Pica

Pica is defined as the constant eating of culturally and developmentally unsuitable and non-edible substances (Grupta et al., 2007). Although it is considered normal in some parts of the world, the prevalence is higher under 2 years of age, during childhood and pregnancy, and is predicted to be related with iron deficiency anaemia and also with celiac disease and sickle cell anaemia (Korman, 1990). Although the most common forms of Pica are known as geophagia (clay, sand, mud, soil), pagophagia (ice), trichophagia (hair), amylophagia (starch), pica cases can eat most of the non-edible substances as well (Cantürk et al., 2010). Research revealed that the non-nutrients are consumed more in tropical regions during vulnerable periods such as pregnancy and childhood, where density is highest (Young et al., 2011).

DSM-V diagnostic criteria created for Pica in 2013 are as follows:

-Eating non-sustenance, non-nutrient substances for at least a month continuously

-The eating behaviour of non-sustenance, non-nutrient substances are not comparable with one's level of development

-This eating behaviour has neither a cultural basis nor that can be accepted socially as a normal practice.

-If this eating behaviour occurs due to another mental disorder (such as intellectual development disorder, autism spectrum disorder, schizophrenia) or medical condition (including pregnancy) additional clinical precaution is required (American Psychiatric Association, 2013).

In addition, although some vitamin and mineral deficiencies have been reported in the case of pica, there are generally no specific biological abnormalities. In some cases, pica is only noticed after general medical complications (American Psychiatric

Association, 2013). There is no single test that can be used to diagnose pica. Since it can be seen in people with nutritional deficiencies, the physician can evaluate iron and zinc serum levels when necessary. Many health problems for instance iron deficiency anaemia, metabolic conditions and toxoplasmosis occur in pregnant women who consume non-nutrients (Katzman et al., 2017; Mills, 2007).

Children and adults with pica eating disorders can eat substances such as animal feces, clay, dust, hairballs, ice, paint, sand. Depending on which substance is eaten, symptoms such as abdominal pain and nausea or other signs of malnutrition, weakness, behavioural problems and school problems, may occur as a result of obstruction in the stomach and intestine. In a study conducted among the children in Jamaica, it was found that constipation, diarrhea and intestinal worm were higher than those without pica eating disorders (Katz et al., 2011).

Other medical conditions such as nutrient loss and lead poisoning should be treated first during Pica treatment. A multidisciplinary treatment plan should be prepared covering long-term behavioural education, environmental education and family education. First of all, pica behaviour should be punished at the very beginning of the treatment. Then, person should be awarded when he/she eats normal nutrition's. Also, if pica is part of a developmental disorder such as mental deficiency then the medical treatment could reduce the abnormal behaviour (Katz et al., 2011).

1.1.2.3 Rumination Disorder

Although the frequency of occurrence data for rumination disorder is not certain, it has been reported that it is higher in certain groups, such as people with mental disabilities (American Psychiatric Association, 2013). It is a psychological disorder characterized by the fact that the person regorges the foods he/she eats frequently for at least a month. The individual can chew, re-swallow or regorge these foods (Yılmaz, 2015). For an individual with a regorge disorder, this often occurs 1-

2 hours after eating and is often described as a chronic condition that occurs generally after each meal (Talley, 2011).

According to DSM-V, the diagnostic criteria for rumination disorder are:

-Frequent regorge of the food that he/she ate for at least a month. Thrown up food can be re-chewed, re-swallowed or spit out.

-Frequent regorge cannot be attributed to concomitant gastrointestinal disease or any other health condition.

-This eating disorder should not only occur during avoidant/restricted food intake disorder, anorexia nervosa, bulimia nervosa, binge eating disorder.

-If eating disorder occurs in the end of another mental disorder (such as intellectual development disorder or neurodevelopmental disorders) additional clinical precaution is required (American Psychiatric Association, 2013). Although there is no diagnostic test in individuals with rumination disorder, then the key to diagnosis in this patient group is to take a detailed anamnesis (Talley, 2011).

Individuals with rumination disorder often misinterpret the symptoms and apply to the hospital with the complaint of regurgitation or gastro-oesophageal reflux. This disorder occurs with a 'repeated vomiting'. When no detailed anamnesis is taken, the physician can conclude that the patient has gastroparesis or another vomiting syndrome (i.e., eating disorder) and can recommend diagnostic tests and treatments for vomiting that does not help the patient. Therefore, patients should be asked to speak in more detail in order to state their symptoms, and the correct diagnosis should be made with an accurate history (Talley, 2011).

Rumination disorder is a rare gastrointestinal functional disorder that is hard to diagnose and most of the physicians are not even aware of this condition (Chial et al., 2003). In many conditions, patients are subjected to numerous test and various treatments can be given based on misdiagnosis. Since it is multifactorial, the treatment

can be difficult and complicated when the diagnosis is accurate. Since the rumination disorder is a behaviour originated disease, its treatment is not known precisely today, but breathing techniques are recommended by the psychologists during and after the meal (Chitkara et al., 2006). It is shown that pharmacological and antireflux therapy has not been beneficial in these patients. Since the endoscopic fundoplication method is also not tested, its effect on this disorder is considered uncertain (Talley, 2011).

1.1.2.4 Avoidant/ Restrictive Food Intake Disorder

Avoidant/ restrictive food intake disorder is a new diagnostic category in the nutrition and eating disorders section of DSM-V. It is known that avoidant / restrictive food intake disorder constitutes 5.0-22.5% of paediatric eating disorders. (Nakai et al., 2017). Although the studies examining the incidence in adults are quite limited, it is known that the patients with avoidant/ restrictive food intake disorders are younger and higher in males compared to the patients with anorexia nervosa or bulimia nervosa (Norris et al., 2016). A study revealed that 4 of 45 malnourished adult patients had avoidant/ restrictive food intake disorders, but none of these patients had a clinical picture (Tanaka et al., 2015).

The DSM-V diagnose criteria that has been formed in 2013 are:

- Nutrition and eating disorders in which there is a persistent failure to meet nutritional and/or energy needs due to one (or more) of the following: (i.e., lack of interest in eating or nutrition, avoidance based on the sensory properties of foods, concern about the consequences of eating).

-Important amount of weight loss (or inability in expected weight gain or growth retardation in children)

- Serious nutritional deficiencies

-Addiction to enteral nutrition or oral nutritional supplements

-Significant problems in psychosocial functionality

-The disorder cannot be explained by existing nutritional deficiencies or cultural limitations

-Eating disorder is not only seen during anorexia nervosa or bulimia nervosa, and there is no evidence of in which way the person's body weight or body shape alters.

-Eating disorder is not associated with a concurrent medical condition or better explained with mental disorders. When eating disorder occurs due to another condition or disorder, additional clinical precaution is required (American Psychiatric Association, 2013).

Individuals with avoidant / restrictive food intake disorders may experience weight loss, growth retardation and significant nutritional deficiency due to enteral nutrition or oral nutritional supplementation or psychosocial functions. In addition, these individuals show behaviours and symptoms specific to this disease, such as eating avoidance, choosing what to eat, functional dysphagia, loss of appetite and abdominal pain, and are often diagnosed with accompanying psychiatric and/ or medical symptoms. However, these individuals do not have weight/ shape anxiety in anorexia nervosa and bulimia nervosa (Norris et al., 2016).

Individuals with avoidant / restrictive food intake disorders apply to the healthcare professional with different medical and psychiatric conditions affecting food intake without worrying about shape. Patients may be anxious in response to stress or trauma, react to dangerous foods and chemicals, avoid the risk of pain, nausea, and vomiting, avoid bad-tasting foods, and show stressful reactions at eating times. These patients should apply an appropriate health center in the first place (Fisher et al., 2014). Today, although there is no evidence-based treatment for this eating disorder, clinical experiences show that the needs of patients may differ depending on which factor caused this eating disorder. Since avoidant / restrictive food intake disorder treatment guidelines have not been developed, the process of hospital stay is prolonged in these patients (Norris et al., 2016).

1.1.2.5. Anorexia Nervosa

Anorexia nervosa, specified by William W. Gull in 1873, meaning nervous anorexia; it is a psychological disease in which the energy received through behaviour of refusing, reducing or compensating to eat is tried to be controlled (Yücel, 2009). A person with anorexia nervosa resists even maintaining the lowest possible body weight and is extremely afraid of weight gain (Köroğlu, 2009). Anorexia nervosa is divided into two as restrictive type and binge eating type. Refusing to eat in order not to gain weight is called restrictive eating type, the progress of vomiting oneself or using medicine is called binge eating type. While the prevalence of anorexia nervosa in young women is about 4.0%, the data on the prevalence in men are less, but in clinical cases it is known that the ratio of female / male patients is approximately 10/1. Some special groups, such as athletes, models, ballerinas, and young people, focus on food and body shape, reducing their intake of food obsessively, increasing the risk of developing anorexia nervosa (American Psychiatric Association, 2013).

Diagnostic criteria for anorexia nervosa the DSM-V diagnostic criteria created in 2013 are;

-The situation of restricting energy intake according to the requirements leads to a significantly lower body weight in the context of the person's age, gender, the path he/she has developed, and his/her body health.

-Being afraid of gaining or getting fat or engaging in behaviour that makes it difficult to gain weight even though it has an apparent low body weight.

-There is a disorder that how the person perceives body weight or shape. While evaluating oneself, the person places an unreasonable importance on body weight and shape or can never realize the importance of low body weight at that time (American Psychiatric Association, 2013).

Individuals who are anorectic have very low body weight, which can lead to serious medical problems. The most common are as follows: low blood pressure, slowed down breathing and pulse, weakening of the bone structure, facial hair increase, infertility, dizziness and fainting, hair loss, dehydration, kidney damage, low body temperature. Some of these problems are cured as a result of full recovery, while others may not, especially the bones which are damaged. It is important to start treatment as early as possible, as many of the more serious medical consequences of anorexia nervosa are only associated with long-term eating problems (Chavez and Insel, 2007).

Return the person to a healthy body weight in the treatment of anorexia nervosa: to treat psychological problems caused by eating disorders: It is aimed to reduce the behaviours or thoughts that cause eating disorders and to prevent them from recurring. Inpatient treatment is required for individuals whose body weight is 20% below the weight. Although data on the efficacy of treatment with selective serotonin re-uptake inhibitors in anorexia nervosa are restrictive, recent research indicates that this drug group is effective in preventing recurrence of disease attacks (Öyeçkin and Şahin, 2011). There is also growing evidence of the effectiveness of cognitive-behavioural therapies on this disease. Psychodynamically oriented psychotherapies, focal analytical approaches, family therapy are known to be beneficial (Carter et al., 2011).

1.1.2.6. Bulimia Nervosa

It is a psychological disease that is used in compensatory methods that are not suitable for preventing weight gain as a result of binge eating. The type of retching that the person regularly vomits on his own: The type in which the person does not eat or does other compensatory behaviours such as doing extreme sports is classified as a non-retching type (Köroğlu, 2009). The prevalence of bulimia nervosa in young girls is in the range of 1.0-1.5% and this disorder is frequently seen especially in late adolescence and young adulthood. Although there is less information about the

prevalence of bulimia nervosa in men, It affects more women than men. as well as the gender ratio is around 10: 1 (American Psychiatric Association, 2013).

According to DSM-V the diagnosis criteria for bulimia nervosa are;

-Recurring binge eating periods are characterized by both of the following: eating more food in similar conditions, in similar time than most people can, during this period, losing sense of control overeating.

-Repetitive and inappropriate compensatory behaviours such as self-vomiting, using diuretic medicines or other drugs, practically no eating, or doing extreme sports to avoid gaining weight.

-Both of these binge-eating behaviours and inappropriate compensatory behaviours occur, on average, within three months, at least once a week (American Psychiatric Association, 2013).

Bulimia nervosa can cause serious medical consequences, as described below. Dental caries and menstrual irregularities are the most common health problems associated with bulimia nervosa, but other health problems occur in more serious and long-term situations. These health problems are as follows: dental caries, menstrual irregularities, colon and intestine injuries, constipation, heart and kidney diseases, swelling, especially in the face and fingers, mineral imbalances. Also, in bulimic individuals can often be observed different psychological diseases such as depression, anxiety and/ or drug addiction (Chavez and Insel, 2007).

While the treatment of the majority of patients is continued with outpatient follow-up, individuals should be hospitalized in the presence of persistent symptoms that cause excessive weakening and personality disorders. Rapid improvements have been made in the pharmacological treatment of bulimia nervosa compared to anorexia nervosa therapy. Furthermore, cognitive behavioural psychotherapy programs are known to be effective. Important benefits are provided when psychotherapy and

pharmacological treatment are applied together in bulimic individuals (Öyeçkin and Şahin, 2011).

1.1.2.7. Binge Eating Disorder

It is a psychological disease defined as consuming more food than most people can eat in a certain period of time, under similar conditions and at the same time. Another feature of eating disorder is that the person does not control the amount of food he/she eats during the meal and has a feeling of loss of control in the form of not being able to stop eating (Köroğlu, 2009). The prevalence of binge eating disorder among adult women and men in the United States was 1.6% and 0.8% (American Psychiatric Association, 2013). Diagnosis criteria for binge eating disorder the DSM-V diagnostic criteria established in 2013 are as follows:

-Eating more in a certain period of time (i.e., within any 2 hour period) than similar to most individuals under similar conditions.

-Feeling of losing control during eating (for example, feeling that one cannot stop eating, control what one eats or how much one eats)

-Eating periods are accompanied by three or more of the following: eating much faster than usual, eating until feeling uncomfortable enough satiety, eating excessive amounts without physical hunger, eating alone for being embarrassed of the amount of the meal is eaten, self-disgust after meal or feeling guilty, a significant annoyance with eating binge is felt. These binge eating situations occur at least once a week within an average of three months (American Psychiatric Association, 2013).

Symptoms of binge eating disorder can be physical, psychological, and behavioural. Exhaustion, food intolerance and bloating are the most common symptoms. In addition, the following symptoms are also frequently seen; eating, weighing in busy with foods, body shape and weight, excessively dissatisfied by body, low self-esteem, depression, anxiety and nervousness, embarrassment, self-hate and

guilt after eating, self-harm, using drugs or suicide attempts. The main goals in treating binge eating disorder are elimination of obstructive eating attacks and gaining a healthy eating habit, having a steady body weight, are the treatment of obesity related diseases as well as mental disorders. To achieve these goals, drug treatments, cognitive-behavioural therapy, psychotherapies and bariatric surgery provide important benefits (Turan et al., 2015).

1.1.2.8. Orthorexia Nervosa

Orthorexia nervosa (ON) is an eating disorder that defines excessive mental struggle against healthy foods. (Bratman, 2000). Bratman (2000) created this term in 1997, from ortho which means strict, true, and orexins, which means hunger. Orthorexia means “proper nutrition”. According to Bratman (2000), it is a pathological obsession with proper eating, and the aim is to maintain and improve health. The purpose of ON patients is not to be thin. Patients with ON do not feel fat, and if the diet is perfect, they will have a mental occupation that everything will be fine. They aim to be really or exaggeratedly healthy or balanced (Bratman, 2000). This disorder is not a weight loss diet, but rather an extreme phobia of eating only "pure" foods. The disorder includes boundaries ranging from eating only raw vegetables and insisting on eating lunch in a particular colour. It is conducted that being orthorexia nervosa means that the individual is not only obsessive about “healthy eating” but also uses certain cooking methods. For example, aluminium containers are among the tools and equipment that these people can never use (Evilly, 2001). It is defined that orthorexia as people's diets as a disease that people see their diet as a way to feel virtuous, clean and even spiritual. The more a person goes on diets for his/her health, the more virtuous he/she feels. Since there are no clinical guidelines for this disorder, it is not seen as a situation that doctors can diagnose according to the diagnostic criteria. It is a condition observed as the most extreme example of dietary purification (Bratman, 2000).

Patients with ON can resort to an extreme self-discipline that includes tighter diet and hunger when they make a mistake in their perfect diet. Costing all vital values

to the act of eating makes orthorexia a disorder that defines it. It has many similarities with anorexia and bulimia, which are two well-known eating disorders, but bulimic and anorectics aim the quantity of food, while orthorectics aim its quality. All three gives food extreme values in their life plans (Donini et al., 2004).

Orthorexia nervosa is only can be defined, if it creates an important negative effect on the person's life i.e. thinking about food to prevent stress, life, thinking how food is prepared to prevent negative emotions, spending the majority of his/her daily thinking about food and when it is seen in the long term. (Dunn and Bratman, 2016).

It is stated that the biggest difference between bulimic and anorectics from orthorectics that bulimic or anorectic have ambitions to lose weight. For orthorectics, diet plans are extremely important. There are countless nutritional philosophers in the world, and a diet plan given by each can lead to an unhealthy nutritional obsession. A strict diet to stay healthy and fit can ironically result in malnutrition. If the diet does not contain diversity, the body can easily experience deficiency of vitamins, minerals and nutrients. Many diets exclude certain or all food groups to maintain health and/ or prevent disease. These short-term diets often cause harm. However, unchanging thing that, is the negative physical and physiological results are inevitable as a result of a long-term controlled diet (Mathieu, 2005).

ON is a kind of obsessive-compulsive disorder. It has been stated that many people discussed if all eating disorders really belong to the obsessive-compulsive class and also stated that the concepts of anorexia and bulimia are well known to remain in a different class. An underlying factor perfectionism was in people who developed compulsions to apply a perfect diet. It was observed that the same thing happened in people who developed other obsessive-compulsive behaviour, such as continuous hand washing, and pointed out that there is definitely a genetic material (Mathieu, 2005).

One of the result of orthorexia is social isolation. Orthorectics are so loyal to what they that they build their lives on these food. It is possible that they shop from the shops which are selling only organic or healthy foods. Since they do not have any idea what are the cooks doing to foods, they avoid going all restaurants. They reduce meeting with family or friends because they eat particular nutritions. Respectively, family and friends avoid orthorectics. Because the only thing that orthorectics talk about healthy nutrition and nourishment (Arusoğlu, 2006).

The problem with the diagnosis is that people can hide behind the concept of proper nutrition. Healthy diets are affirmed and encouraged diets, but healthy diets are acceptable when applied occasionally. If training for bodybuilding competitions is taken or involved in other performance related events, it is necessary to wait for it to end. It is stated that sparing some time to eat what we desire is a necessity. Since suspicions about whether one is orthorectics or not still very new and controversial, researchers are developed a test that there can found an idea about ones tendency to be orthorectics with Orto-15 test (Perkins et al., 2006).

1.1.2.9. Causes of Eating Disorders

It is known that many factors such as genetic, psychological, and sociocultural factors are effective in the development of eating disorders (Salafia et al., 2015). While focusing on sociocultural and family factors in the research of causes of formation of eating disorders for years, it has recently been brought to the agenda that it may pose a risk in environmental factors (Jacobi et al., 2004).

1.1.2.9.1 Genetic Factors

Genetics is an significant factor in the development of eating disorders. Although the effects of genetic factors on the development of eating disorders vary

depending on the eating disorder, the average genetic factor estimates range between 39-74% (Yılmaz et al., 2015). Abnormalities in the regulation of certain neurochemicals such as serotonin are closely associated with eating disorders (Lee et al., 2010; Polivy and Herman, 2002). In addition, early adolescence due to increases or disturbances in circulating sex hormones, especially oestrogen, is associated with irregular eating behaviour (Zehr et al., 2007).

1.1.2.9.2 Sociocultural Factors

Eating disorder is affected by many different sociocultural factors. For instance: Body dissatisfaction and dietary habits of parents in the family are associated with children's eating attitudes and behaviours (Keery et al., 2006). Humiliating comments on body weight and body shape, and pressures for weight loss are associated with body dissatisfaction, irregular eating habits and eating disorders in both men and women (Lee et al., 2010; Stice, 2002). The effects of ones with the same age on the development of eating disorders are also important. The pressure of the same aged ones to reach the ideal body appearance has been taken into consideration as an important factor in the development of eating habits., especially in adolescents (Van den Berg, 2002). Similarly, boy or girl friends also play an important role in the development of eating disorders with negative views about appearance or weight, which can lead to weight anxiety, body dissatisfaction and irregular eating behaviour (Weller and Dziegielewski, 2005). Some competitive sports, such as gymnastics, have a higher risk of developing eating disorders compared to other sports (Kong and Harris, 2015). Also, among athletes who think that their performance will increase when they weigh less than their current weight possibility of eating disorders are more likely to be seen (Krentz and Warschburger, 2013). In conclusion, even it is controversial, media also plays a huge role in developing eating disorders by showing thin body type as an ideal one. Preference for a thin or almost inaccessible body structure is particularly associated with eating disorders such as anorexia nervosa (Slater et al., 2012).

1.1.2.9.3 Psychological Factors

Sexual, physical and emotional abuse is considered a risk factor for many psychiatric problems, including eating disorders (Neumark-Sztainer et al., 2000). Especially in studies, sexual abuse was found in 29% of individuals with eating disorders and physical abuse was found in 57% (Treuer et al., 2005). In addition to that, rather than other abuses, emotional abuse is an important reason for women to develop an eating disorder (Polivy and Herman, 2002). Many of the researches shows that generally age negative situations such as high level of stress, guiltiness, hostility, anxiousness and depressive mood are associated with the eating disorder increase (Lee et al., 2010; Polivy and Herman, 2002; Tyrka et al., 2002). Because perfectionism increases the individual's desire to be slim, researchers see this as a significant risk factor in the development of eating disorders (Stice, 2002; Tyrka et al., 2002). Perfectionism is a factor for eating disorders, especially when combined with low self-esteem, by triggering diet and purification behavior or increasing symptoms of eating disorders (Lee et al., 2010; Stice, 2002).

The purpose of this thesis is to find out if any different exist between professional and semi-professional team sports athletes and individual sports athletes in terms of orthorexia nervosa tendency and in terms of sports nutrition knowledge. As well as to reveal the association between sport nutrition knowledge level and orthorexia tendency if it is the case. Furthermore, to search connection between age of the athletes and sports nutrition knowledge level.

Previous researches focused on either sports nutrition knowledge level or orthorexia tendency of athletes. There is no research aimed to investigate the association between sports nutrition knowledge level and orthorexia nervosa.

2. MATERIALS AND METHOD

2.1 Research Model

The research was carried out as a cross-sectional survey research.

2.2 Subject Group

The study group was composed of 214 volunteer (100 male and 114 female) professional and semi-professional athletes. 108 of these athletes were team sports athletes and 106 of these athletes are individual sport athletes. 40 of all participants were professional athletes and the left was semi-professional athletes. Team sports participants are from basketball, football, handball, rugby and volleyball and individual sports participants are chosen from Taekwondo, athletics, table tennis, judo, boxing, kick box, swimming, wrestling, karate, gymnastics, body building. The sample size was beforehand determined as 105 participants for each group with G * Power 3.1 program. T test: Comparison of the mean of two independent groups; Effect Size f = 0.5; α err probe = 0.05; Power (1-β err probe) = 0.95; Total sample size = 210.

Inclusion criteria for the research are being a professional or semi-professional athlete, not smoking and not having chronic diseases. Exclusion criteria for the research are being under the age of 18, smoking, and having chronic diseases.

2.3 Data Collection Tools

A survey was asked to fill by participants. It includes question to learn demographic information, and sport branches of athletes. The survey also included Orto-15 test, Attitude Scale for Nutritional Ergogenic Support Products, and
The Nutrition for Sport Knowledge Questionnaire.

ORTO-15 test

It is a 15-question scale developed in 2005 to assess orthorexia tendency (Perkins et al., 2006). Each expression is evaluated with a 4-point Likert-type rating. In the scale, individuals are asked to indicate how often they feel themselves as described in the items by selecting one of the “always”, “often”, “sometimes” and “never” options. The answers that are distinctive for orthorexia are given a score of, 1, and those that show a tendency to normal eating behaviour are given a score of 4. Low scores indicate orthorexia tendency.

Each item is graded with one of 1, 2, 3 and 4 points. The lowest 15 and maximum 60 points can be obtained from the scale. In the evaluation of the scale, the increase in score indicates that the risk of orthorexia nervosa is reduced. Those who are obsessed with healthy eating (orthorectic) seem to score lower than this scale (Arusoğlu, 2006). Items 2, 5, 8 and 9 are scored on the contrary. Critical items of the scale are accepted as items 3, 5, 6, 7, 11, 13 and 15. Individuals with an ORTO-15 scale score lower or equal to 40 were considered orthorectic, and those with score higher than 40 points were considered normal (Perkins et al., 2006).

Attitude Scale for Nutritional Ergogenic Support Products

The distribution of the responses of the athletes to the propositions in the Attitude Scale for Nutritional Ergogenic Support Products will be indicated with frequency tables and descriptive statistics such as mean and standard deviation of the scores obtained from the propositions will be given. In the scale developed by Argan and Köse (2009), the questions consisted of Benefit, Side Effect and Ethics and Natural Nutrition sub-groups and it was evaluated using the five-point Likert scale. In scoring the answers given to the questions are ranked from 1 to 5 while the “Strongly Disagree” option is 1, and the “Strongly Agree option is 5.

The Nutrition for Sport Knowledge Questionnaire.

The validity and reliability of The Nutrition for Sport Knowledge Questionnaire (NSKQ) scale for Turkish was conducted in 2019, and it was originally developed in English by Trakman et al. in 2017. The Nutrition for Sport Knowledge Questionnaire (NSKQ)is consisted of 68 items and 6 sub-dimensions titled as Weight Control (3 expressions), Macro Nutrients (22 expressions), Micro Nutrients (12 expressions), Sports Nutrition (11 expressions), Supplements (11 expressions), and Alcohol (9 expressions). The items of the scale are multiple-choice and 3-point Likert type (agree-disagree-not sure; effective-not effective-not sure) (Çırak et al., 2019).

2.4 Statistical Analysis

The data collected from the participants were processed into the statistical program. Descriptive statistics are given for team sports athletes, and individual sports athletes and the whole group. Frequency and percentage analyses were used to determine in order to describe the level of nutrition knowledge, gender, being national athlete or not; To look at the distribution of responses given to the items of the Attitude Scale towards Nutritional Ergogenic Support Products and the distribution of ergogenic support usage frequency. To describe demographic characteristics such as age, training age, Body Mass Index (BMI), number of training days, weekly training hours and to describe orthorexia, sports nutrition knowledge level, benefit, side effects and ethics, natural nutrition variables minimum-maximum values, mean and standard deviation analyses were used. The assumption of normality of orthorexia, sports nutrition knowledge, benefit, side effects and ethics and natural nutrition variables within the groups and in the whole group was checked with skewness and kurtosis analyses. Independent groups t-test was conducted to determine whether orthorexia, sports nutrition knowledge level, benefit, side effects and ethics, natural nutrition levels differ according to the type of sport. Correlation analysis was used to reveal the

relationships between age, training age, orthorexia and sports nutrition knowledge level in professional and semi-professional individual and team sports athletes. Also, the relationship between orthorexia, sports nutrition knowledge level, benefit, side effects and ethics, natural nutrition in professional and semi-professional individual and team sport athletes were determined by correlation analysis. Multiple linear regression analysis was used to determine the descriptors of sports nutrition knowledge level. The significance value was accepted as $p \leq 0.05$ and Statistical software (IBM Statistical Package for Social Sciences (SPSS) version 20IBM, USA) was used.

3. RESULTS

In the result section of the study, the descriptive analyses indicating the characteristics of the study group, the descriptive results of the scales and measurements, tables showing the assumption of normality and whether the variables differ according to the type of sport, the results of the correlation analysis showing the relationships between the variables, the regression analysis results for the independent variables to explain the sports nutrition knowledge level, the distribution of the items of the Attitude Scale towards Nutritional Ergogenic Supports and the use of ergogenic supplements according to individual and team sports are given.

Table 3.1 shows the gender distribution of the study group and whether they are professional athletes or not.

Table 3.1. Frequency and percentages for gender and being professional athlete.

			Sports Type		Total
			Team Sports	Individual Sports	
Gender	Female	n	73	41	114
		%	34.1	19.2	53.3
	Male	n	35	65	100
		%	16.4	30.4	46.7
Professional Athlete	Yes	n	17	23	40
		%	7.9	10.7	18.7
	No	n	91	83	174
		%	42.5	38.8	81.3
Total		n	108	106	214
		%	50.5	49.5	100.0

According to the table, 50.5% of the participants are engaged in team sports and 49.5% are engaged in individual sports. It is seen that 53.3% of the participants are female and 46.7% are male. The rate of those who are professional athletes is 18.7%, the rate of those who are semi-professional athletes is 81.3%.

In Table 3.2, descriptive statistics for age, training age, BMI, number of training days and weekly training hours are given.

Table 3.2. Descriptive statistics for age, training age BMI, number of days trained, and hours of weekly training.

	Team Sports				Individual Sports				Total			
	Min	Max	M	Sd	Min	Max	M	Sd	Min	Max	M	Sd
Age (year)	18.00	28.00	22.19	2.16	18.00	30.00	22.59	2.11	18.00	30.00	22.39	2.14
Training age (year)	3.00	15.00	9.38	2.69	4.00	17.00	10.00	2.51	3.00	17.00	9.69	2.61
BMI (kg/m^2)	18.28	25.94	21.94	1.92	18.02	27.76	22.36	2.33	18.02	27.76	22.15	2.14
Number of training days	2.00	6.00	4.75	1.02	2.00	7.00	5.26	0.83	2.00	7.00	5.01	0.96
Weekly training hours	5.00	35.00	12.15	3.69	6.00	35.00	15.48	5.13	5.00	35.00	13.80	4.75

Min: Minimum; Max: Maximum; M: Mean; Sd: Standard Deviation.

According to Table 3.2, the mean values for age are 22.19±2.16 for professional and semi-professional team sport athletes, 22.59±2.11 for individual sports athletes and 22.3±2.14 for whole group.The mean training age is 9.38±2.69 for team sport athletes 10.00±2.51 for individual sport athletes and 9.69±2.61 for the whole group. BMI was 21.94±1.92 for team sport athletes, 22.36±2.33 for individual sport athletes, and 22.15±2.14 for all participants. Team sport athletes train 4.75±1.02 days a week, individual sport athletes 5.26±0.83 days, all participants train 5.01±0.96 days a week. Weekly training hours are 12.15±3.69 hours for team sport athletes, 15.48±5.13 hours for individual sport athletes and 13.80±4.75 hours for both groups.

In Table 3.3, the frequencies and percentages of the sports nutrition knowledge level are given.

Table 3.3. Frequency and percentages of sports nutrition knowledge level.

Sport Type	Sports Nutrition Knowledge Level									
	Poor		Average		Good		Excellent		Total	
	n	%	n	%	n	%	n	%	n	%
Team Sports	50	46.3	32	29.7	22	20.3	4	3.7	108	50.5
Individual Sports	54	50.9	18	16.9	17	16.1	17	16.1	106	49.5
Total	104	48.6	50	23.4	39	18.2	21	9.8	214	100.0

n: number

According to Table 3.3, 46.3% of professional and semi-professional team sport, 50.9% of individual sport athletes and 48.6% of all athletes have poor nutritional knowledge. The nutritional knowledge level of 29.7% of team sport athletes, 16.9% of individual sport athletes and 23.4% of all athletes is average. Good nutrition knowledge level is 20.3% for team sport athletes, 16.1% for individual sport athletes and 18.2% for the whole group. Excellent nutrition knowledge level is 3.7% for team sport athletes, 16.1% for individual sport athletes and 9.8% for the whole group.

Table 3.4 shows the minimum-maximum values, mean and standard deviations of the scores of the scales.

Table 3.4. Minimum-maximum values, mean and standard deviations of scores of the scales.

Variables	Team Sports				Individual Sports				Total			
	Min.	Max.	M	Sd	Min.	Max.	M	Sd	Min.	Max.	M	Sd
Orthorexia	24.00	48.00	38.40	4.58	22.00	47.00	36.37	5.85	22.00	48.00	37.40	5.34
Sports Nut. Knowledge Level.	1.00	55.00	33.53	11.83	12.00	64.00	33.45	14.18	1.00	64.00	33.49	13.02
Benefit	1.00	5.00	3.71	0.79	1.00	5.00	3.50	0.87	1.00	5.00	3.61	0.84
Side effects and Ethics	1.00	4.00	2.62	0.73	1.00	5.00	2.75	0.77	1.00	5.00	2.68	0.75
Natural Nutrition	1.00	5.00	2.85	0.80	1.00	5.00	2.92	0.83	1.00	5.00	2.88	0.82

Min: Minimum; Max: Maximum; M: Mean; Sd: Standard Deviation

Orthorexia scale mean score is 38.40±4.58 for professional and semi-professional team sports athletes, 36.37±5.85 for professional and semi-professional individual sports athletes and 37.40±5.34 for all athletes. Sports nutrition knowledge level was 33.53±11.83 in team sports athletes, 33.45±14.18 in individual sports athletes and 33.49±13.02 in the whole group.

Attitude Scale for Nutritional Ergogenic Support Products scales sub-dimensions; Benefit sub-dimension mean score is 3.71±0.79 for team sports athletes, 3.50±0.87 for individual sports athletes and 3.61±0.84 for all athletes. Side effects and ethics sub-dimensions were 2.62±0.73 in team sports athletes, 2.75±0.77 in individual sports athletes, and 2.68±0.75 in the whole group. The mean scores of the natural nutrition sub-dimension are 2.85±0.80 for team sports athletes, 2.92±0.83 for individual sports athletes, and 2.88±0.82 for all athletes.

Table 3.5 shows the skewness and kurtosis values of the variables.

Table 3.5. Skewness and Kurtosis values of the variables.

Variables	Team Sports		Individual Sports		All Participants	
	Skewness	Kurtosis	Skewness	Kurtosis	Skewness	Kurtosis
Age (year)	.150	.119	.532	.649	.527	-.607
Training age (year)	-.380	-497	.194	.224	-.146	-.056
Orthorexia	-.846	1.290	-.991	.361	-1.039	1.023
Sports Nut. Knowledge Level.	-.579	.085	.167	-1.388	-.113	-.844
Benefit	-.446	.508	-.420	.184	-.454	.324
Side effects and Ethics	.589	-.684	.461	-.544	.527	-.607
Natural Nutrition	.277	-.849	.244	-.778	.262	-.815

The skewness and kurtosis values between -2 and +2 indicate that the data is normally distributed (George and Mallery, 2010). Age, training age, orthorexia, sports nutrition knowledge level, benefits, side effects and ethics, and natural nutrition score averages are between -2 +2 in professional and semi-professional team sports and individual sports groups and for all participants. The data show normal distribution in the whole group and within the group. Therefore, parametric tests were chosen for comparisons between groups.

Table 3.6 shows the comparison of orthorexia, sport nutrition knowledge level, benefit, side effects and ethics and natural nutrition scores according to the type of sport.

Looking at the table, Attitude Scale for Nutritional Ergogenic Support Products sub-dimensions' natural nutrition ($t=-0.65$; $p>.05$), side effects and ethics ($t=-1.30$; $p>.05$), benefit ($t=1.78$; $p>.05$) and Sport Nutrition Knowledge level ($t=0.04$; $p>.05$) mean scores do not differ between professional and semi-professional team sports and individual sports athletes. In addition, the level of orthorexia in professional and semi-professional team sports athletes was found to be significantly higher than in professional and semi-professional individual athletes ($t=2.83$; $p<.05$).

Table3.6. Comparison of orthorexia, sport nutrition knowledge level, benefit, side effects and ethics, natural nutrition scores by sport type.

Variables	Sport Type	M	Ss	t	sd	p
Orthorexia	Team s.	38.40	4.58	2.83	212	0.005*
	Individual s.	36.37	5.85			
Sport Nutrition Knowledge Level	Team s.	33.53	11.83	0.04	212	0.962
	Individual s.	33.45	14.18			
Benefit	Team s.	3.71	0.79	1.78	212	0.077
	Individual s.	3.50	0.87			
Side Effects and Ethics	Team s.	2.62	0.73	-1.30	212	0.195
	Individual s.	2.75	0.77			
Natural Nutrition	Team s.	2.85	0.80	-0.65	212	0.518
	Individual s.	2.92	0.83			

*p<.05 Min: Minimum; Max: Maximum; M: Mean; Sd: Standard Deviation

Table 3.7 shows the correlations between age, training age, orthorexia and Sports nutrition knowledge level for professional and semi-professional team sport athletes.

Table 3.7. Correlations between age, training age, orthorexia, and sports nutrition knowledge level for team sports athletes

Variables	Age (Year)	Training age (Year)	Orthorexia	Sports Nutrition Knowledge Level
Age (Year)	1			
Training age (Year)	.290**	1		
Orthorexia	.128	-.045	1	
Sports Nut. Knowledge Level	.366**	.086	.192*	1

**. The correlation is significant at the 0.01 level.

*. The correlation is significant at the 0.05 level.

According to the table it is concluded that there is a positive and significant correlation between the age, training age and sports nutrition knowledge level and between orthorexia and sports nutrition knowledge level in professional and semi-professional team sports athletes. According to these findings, as the age increases, the sports age, and the level of sports nutrition knowledge increase, and as the level of sports nutrition knowledge increases, the level of orthorexia increases.

In Table 3.8, correlations between age, training age, orthorexia and sports nutrition knowledge level for professional and semi-professional individual sports athletes are given.

Table 3.8. Correlations between age, training age, orthorexia, and sports nutrition knowledge level for individual sports athletes.

Variables	Age (Year)	Training age (Year)	Orthorexia	Sports Nutrition Knowledge Level
Age (Year)	1			
Training age (Year)	.149	1		
Orthorexia	-.038	.115	1	
Sports Nut. Knowledge Level	.407**	-.338**	-.425**	1

**. The correlation is significant at the 0.01 level.

According to the table, it was determined that there was a negative and significant relationship between the sports nutrition knowledge level and age, and a negative and significant relationship between the training age and orthorexia. As the training age and the level of orthorexia increase, the level of sports nutrition knowledge decreases. As the age of the athlete increases, the level of sports nutrition knowledge increases.

Table 3.9 shows the correlations between age, training age orthorexia and sports nutrition knowledge level for all participants.

Table 3.9. Correlations between age, training age, orthorexia, and sports nutrition knowledge level for all participants.

Variables	Age (Year)	Training age (Year)	Orthorexia	Sports Nutrition Knowledge Level
Age (Year)	1			
Training age (Year)	.232**	1		
Orthorexia	.018	.017	1	
Sports Nut. Knowledge Level	.384**	-.134*	-.174*	1

**. The correlation is significant at the 0.01 level.

*. The correlation is significant at the 0.05 level.

Looking at the table, it is seen that there are positive and significant correlations between age, training age and sports nutrition knowledge level for all athletes. As age increases, the training age and the level of sports nutrition knowledge increase. It was found that there were negative and significant correlations between sports nutrition knowledge level, training age and the level of orthorexia. As the training age and the level of orthorexia increase, the level of sports nutrition knowledge decreases.

Table 3.10 shows the correlations between orthorexia and sports nutrition knowledge level, and sub-dimension of benefit, side effects and ethics, natural nutrition in the attitude scale towards nutritional ergogenic support for team sports athletes.

Table 3.10. Correlations between orthorexia and sports nutrition knowledge, benefit, side effects and ethics, natural nutrition for team sports athletes.

Variables	Orthorexia	Sports Nut. Knowledge Level	Benefit	Side effects and Ethics	Natural Nutrition
Orthorexia	1				
Sports Nut. Knowledge Level	.192*	1			
Benefit	-.164	-.131	1		
Side effects and Ethics	.088	.002	-.188	1	
Natural Nutrition	.168	.041	-.081	.426**	1

**. The correlation is significant at the 0.05 level.

*. The correlation is significant at the 0.01 level.

According to the table, there are positive and significant correlations between orthorexia and athlete nutrition knowledge level for team athletes. There are positive and significant correlations between natural nutrition, side effects and ethics. There are positive and significant correlations between the sub-dimension of natural nutrition and side effects and ethics in the attitude scale towards nutritional ergogenic supports.

Table 3.11 shows the correlations between orthorexia and sports nutrition knowledge level, and sub-dimension of benefit, side effects and ethics, natural nutrition in the attitude scale towards nutritional ergogenic support for individual sports athletes.

Table 3.11. Correlations between orthorexia and sports nutrition knowledge, benefit, side effects and ethics, natural nutrition for individual sports athletes.

Variables	Orthorexia	Sports Nut. Knowledge Level	Benefit	Side effects and Ethics	Natural Nutrition
Orthorexia	1				
Sports Nut. Knowledge Level	-.425**	1			
Benefit	.036	.008	1		
Side effects and Ethics	.054	-.003	.101	1	
Natural Nutrition	.076	.191	.053	.396**	1

*. The correlation is significant at the 0.01 level.

According to the table, it is seen that there is a significant and negative relationship between the level of orthorexia in professional and semi-professional individual sports athletes and the level of Sports nutrition knowledge. As the athlete's nutrition knowledge level increases, the level of orthorexia decreases. The correlation between the sub-dimensions of side effects and ethics and natural nutrition in the attitude scale towards nutritional ergogenic support is positive and significant.

The model summary for multiple regression analysis is given in Table 3.12.

Table 3.12. Model summary for multiple regression analysis.

Resource	Sum of squares	sd	Mean of squares	f	p
Invariant	2046.52	4	511.63		
Residual	34076.96	209	163.04	3.138	0.016
Total	36123.49	213			

When the table is examined, it is seen that the analysis of variance for the model is significant. The significance of the test indicates that the data explains the model well.

Table 3.13 shows the results of the regression analysis for orthorexia, sub-dimension of benefit, side effects and ethics, natural nutrition in the attitude scale towards nutritional ergogenic support to explain the sports nutrition knowledge level.

Table 3.13. Regression analysis results for orthorexia, benefit, side effects and ethics, natural nutrition to explain sports nutrition knowledge level.

Variables	ß	Error	Beta	t	p	95% Confidence Interval	
						Lower limit	Upper limit
Invariant	49.212	8.022		6.135	< 0.001	33.398	65.027
Orthorexia	-0.463	0.165	-0.190	-2.813	0.005	-0.788	-0.139
Benefit	-0.873	1.041	-0.056	-0.839	0.402	-2.926	1.179
Side effects and Ethics	-1.082	1.270	-0.063	-0.852	0.395	-3.585	1.421
Natural Nutrition	2.659	1.176	0.167	2.262	0.025	0.341	4.977
R=0.238	R^2=0.057						

According to the results of the multiple linear regression analysis conducted to determine whether orthorexia, sub-dimension of benefit, side effects and ethics, natural nutrition in the attitude scale towards nutritional ergogenic support explain the sports nutrition knowledge level in the whole group, it was determined that the natural nutrition sub dimension and orthorexia variables contributed significantly to the explained variance (F_{reg}=3.138; p=0.025; p<0.001).

In the Table 3.14 the distribution of the answers given by the professional and semi-professional team sports athletes to the items of the attitude scale towards nutritional ergogenic supports is given.

Table3.14. Distribution of team sports athletes' responses to the attitude scale for nutritional ergogenic support products items.

Attitude Scale for Nutritional Ergogenic Support Products	Strongly Disagree		Disagree		Not Sure		Agree		Strongly Agree		M	Sd
	n	%	n	%	n	%	n	%	n	%		
Benefit												
1. Nutritional ergogenic support products are necessary for sports	1	0.9	5	4.6	30	27.8	39	36.1	33	30.6	3,90	0,92
2. Nutritional ergogenic support products increase performance	1	0.9	8	7.4	27	25.0	47	43.5	25	23.2	3,80	0,91
3. Nutritional ergogenic support products are used correctly	6	5.6	15	13.9	28	25.9	43	39.8	16	14.8	3,44	1,07
4. Every athlete should use nutritional ergogenic support products	1	0.9	12	11.1	37	34.3	34	31.5	24	22.2	3,62	0,98
5. Nutritional ergogenic support products should be easily available	0	0.0	6	5.6	26	24.1	51	47.2	25	23.1	3,87	0,82
Side effects and ethics												
6. Nutritional ergogenic support products create a doping effect	16	14.8	20	18.5	50	46.3	18	16.7	4	3.7	2,75	1,02
7. Nutritional ergogenic support products have side effects	6	5.6	18	16.7	54	50.0	26	24.1	4	3.7	3,03	0,88
8. The use of nutritional ergogenic support products is illegal	22	20.4	30	27.7	41	38.0	14	13.0	1	0.9	2,46	0,98
9. The use of Nutritional ergogenic support products is unethical	25	23.1	34	31.1	33	30.6	10	9.2	6	5.6	2,42	1,11
Natural nutrition												
10. Natural nutrition is sufficient in sports	12	11.1	29	26.9	34	31.5	21	19,4	12	11.1	2,92	1,16
11. Nutritional ergogenic support products are only used in bodybuilding sports	25	23.1	31	27.8	30	27.7	18	16.7	4	3.7	2,49	1,13
12. The same performance can be achieved without the use of nutritional ergogenic support products.	4	3.7	20	18.5	51	47.2	29	26.9	4	3.7	3,08	0,86
13. Nutritional ergogenic support products are psychologically addictive	7	6.4	37	34.3	37	34.3	21	19.4	6	5.6	2,83	1,00

M: Mean; Sd: Standart Deviation

Looking at the table, the average for benefit sub-dimension for the item Nutritional ergogenic support products are necessary for sports is 3.90±0.92, the average for benefit sub-dimension for the item Nutritional ergogenic support products increase performance is 3.80±0.91, the average for benefit sub-dimension for the item Nutritional ergogenic support products are used correctly is 3.44±1.07, the average for benefit sub-dimension for the item Every athlete should use nutritional ergogenic support products is 3.62±0.98 and, the average for benefit sub-dimension for the item Nutritional ergogenic support products should be easily available is 3.87±0.82. It is seen that the answers of the team sports athletes are concentrated in the options of Not sure and Agree.

In the professional and semi-professional team sports athletes the average for side effects and ethics sub-dimension for the item Nutritional ergogenic support products create a doping effect is 2.75±1.02, the average for side effects and ethics sub-dimension for the item Nutritional ergogenic support products have side effects 3.03±0.88, the average for side effects and ethics sub-dimension for the item the use of nutritional ergogenic support products is illegal is 2.46±1.08 and, the average for side effects and ethics sub-dimension for the item the use of Nutritional ergogenic support products is unethical is 2.42±1,11. It is seen that the answers given by the athletes are concentrated in the options Disagree and Not Sure.

The average for natural nutrition sub-dimension for the item Natural nutrition is sufficient in sports is 2.92±1.16, the average for natural nutrition sub-dimension for the item Nutritional ergogenic support products are only used in bodybuilding sports is 2.49±1.13, the average for natural nutrition sub-dimension for the item The same performance can be achieved without the use of nutritional ergogenic support products is 3.08±0.86, the average for natural nutrition sub-dimension for the item Nutritional ergogenic support products are psychologically addictive is 2.83±1.00. It is seen that the answers given by the team sports athletes are concentrated in the options Disagree and Not sure.

The distribution of the answers given by the professional and semi-professional individual sports athletes to the items of the attitude scale towards nutritional ergogenic supports is given in the Table 3.15.

Table3.15. Distribution of individual sports athletes' responses to the attitude scale for nutritional ergogenic support products items.

Attitude Scale for Nutritional Ergogenic Support Products	Strongly Disagree		Disagree		Not Sure		Agree		Strongly Agree		M	Sd
	n	%	n	%	n	%	n	%	n	%		
Benefit												
1. Nutritional ergogenic support products are necessary for sports	4	3.8	8	7.5	32	30.2	39	36.8	23	21.7	3,65	1,02
2. Nutritional ergogenic support products increase performance	4	3.8	13	12.3	30	28.3	42	39.6	17	16.0	3,51	1,02
3. Nutritional ergogenic support products are used correctly	3	2.8	9	8.5	41	38.7	37	34.9	16	15.1	3,50	0,94
4. Every athlete should use nutritional ergogenic support products	2	1.9	19	17.9	36	34.0	34	32.1	15	14.1	3,38	1,00
5. Nutritional ergogenic support products should be easily available	0	0.0	13	12.3	42	39.6	33	33.1	18	17.0	3,52	0,91
Side effects and ethics												
6. Nutritional ergogenic support products create a doping effect	16	15.1	28	26.4	38	35.8	19	17.9	5	4.8	2,70	1,07
7. Nutritional ergogenic support products have side effects	2	1.9	23	21.6	45	42.5	34	32.1	2	1.9	3,10	0,82
8. The use of nutritional ergogenic support products is illegal	16	15.1	30	28.3	44	41.5	15	14.2	1	0.9	2,57	0,94
9. The use of Nutritional ergogenic support products is unethical	11	10.4	37	34.9	39	36.8	14	13.2	5	4.8	2,66	0,99
Natural nutrition												
10. Natural nutrition is sufficient in sports	11	10.4	33	33.1	29	27.4	26	24.5	7	6.6	2,85	1,10
11. Nutritional ergogenic support products are only used in bodybuilding sports	16	15.1	24	22.6	40	37.8	17	16.0	9	8.5	2,80	1,14
12. The same performance can be achieved without the use of nutritional ergogenic support products.	5	4.8	21	19.8	42	39.6	30	28.3	8	7.5	3,14	0,98
13. Nutritional ergogenic support products are psychologically addictive	7	6.6	16	15.1	50	47.1	29	27.4	4	3.8	3,06	0,91

M: Mean; Sd: Standart Deviation n: Number

Looking at the answers of professional and semi-professional individual sports athletes, the average for benefit sub-dimension for the item Nutritional ergogenic support products are necessary for sports is 3.65±1.02, the average for benefit sub-dimension for the item Nutritional ergogenic support products increase performance is 3.51±1.02, the average for benefit sub-dimension for the item Nutritional ergogenic support products are used correctly is 3.50±0.94, the average for benefit sub-dimension for the item Every athlete should use nutritional ergogenic support products is 3.38±1.00 and, the average for benefit sub-dimension for the item Nutritional ergogenic support products should be easily available is 3,52±0,91. It is seen that the answers of the individual sports athletes are concentrated in the options of Not sure and Agree.

In the professional and semi-professional individual sports athletes the average for side effects and ethics sub- dimension for the item Nutritional ergogenic support products create a doping effect is 2.70±1.07, the average for side effects and ethics sub-dimension for the item Nutritional ergogenic support products have side effects 3.10±0.82, the average for side effects and ethics sub-dimension for the item the use of nutritional ergogenic support products is illegal is 2.57±0.94 and, the average for side effects and ethics sub-dimension for the item the use of Nutritional ergogenic support products is unethical is 2.66±0.99. It is seen that the answers given by the athletes are concentrated in the options Disagree and Not Sure.

The average for natural nutrition sub-dimension for the item Natural nutrition is sufficient in sports is 2.85±1.10, the average for natural nutrition sub-dimension for the item Nutritional ergogenic support products are only used in bodybuilding sports is 2.80±1.14, the average for natural nutrition sub-dimension for the item The same performance can be achieved without the use of nutritional ergogenic support products is 3.14±0.89, the average for natural nutrition sub-dimension for the item Nutritional ergogenic support products are psychologically addictive is 3.06±0.91. It is seen that the answers given by the individual sports athletes are concentrated in the options Not sure and Agree.

Table 3.16 shows the frequency of use of ergogenic aids by professional and semi-professional team sports athletes.

Table 3.16. Ergogenic aids usage frequency of team sports athletes.

Ergogenic Aids	Everydays		2-3 Times a week		3-4 times in a month		Never	
	n	%	n	%	n	%	n	%
Sports Drink	12	11.2	9	8.3	13	12.0	74	68.5
Carbohydrate Powder/Beverage/Gel	1	0.9	19	17.6	16	14.8	72	66.7
Protein Powder	4	3.7	23	21.3	13	12.0	68	63.0
Creatine	2	1.8	19	17.6	15	13.9	72	66.7
Sodium bicarbonate	0	0.0	2	1.8	1	0.9	105	97.3
Caffeine	21	19.4	15	13.9	1	0.9	71	65.8
ß-alanine	0	0.0	3	2.8	0	0.0	105	97.3
Branched-Chain Amino Acid	0	0.0	11	10.2	20	18.5	77	71.3
Hydroxymethyl Butyrate	0	0.0	0	0.0	1	0.9	107	99.1
Glutamine	1	0.9	0	0.0	0	0.0	107	99.1
Multivitamin	7	6.5	6	5.5	0	0.0	95	88.0
Multimineral	1	0.9	1	0.9	0	0.0	106	98.2
Carnitine	1	0.9	2	1.8	0	0.0	105	97.3
Vitamin D	10	9.3	0	0.0	4	3.7	94	87.0
Vitamin C	8	7.4	7	6.5	2	1.8	91	84.3
Probiotic	4	3.7	3	2.8	1	0.9	100	92.6
Magnesium	9	8.3	10	9.3	4	3.7	85	78.7
Iron	1	0.9	2	1.8	0	0.0	105	97.3
B12	5	4.6	5	4.6	6	5.5	92	85.3

When the table is examined, professional and semi-professional team sports athletes do not use vitamin B12 at the rate of 85.3%, sports drink at the rate of 68.5%, carbohydrate powder/drink/gel at the rate of 66.7%, protein powder at the rate of 66%, creatinine 66.7%, sodium bicarbonate at the rate of 97.3%, caffeine at the rate of 65.8%, ß-alanine at the rate of 97.3% branched-chain amino acid at the rate of 71.3%, hydroxymethyl butyrate at the rate of 99.1%, glutamine at the rate of 99.1%, multivitamin at the rate of 88%, multimineral at the rate of 98.2%, carnitine at the rate of 97.3%, vitamin D at the rate of 87%, vitamin C at the rate of 84.3% probiotic at the rate of 92.6%, magnesium at the rate of 78.7%, iron at the rate of 97.3% at all.

In addition, the most common ergogenic supplements are used; sports drink 12% 3-4 times a month, carbohydrate powder / drink / gel 17.6% 2-3 times a week, protein powder 21.3% 2-3 times a week, creatine 17.6% 2-3 times a week, sodium bicarbonate 1.8% 2-3 times a week, caffeine 19.4% every day, ß-alanine 2.8% 2-3 times a week, branched-chain amino acid 18.5% 3-4 times a month, hydroxymethyl butyrate 0.9% 3-4 times a month, glutamine 0.9% every day, multivitamin 6.5% every day, multimineral 0.9% every day and 2-3 times a week, carnitine 1.8% 2-3 times a week, vitamin D 9.3% every day, vitamin C 7.4% every day, probiotic 3.7% every day, magnesium 9.3% 2-3 times a week, iron 1.8% 2-3 times in weeks, and vitamin B12 is used at a rate of 5.5% 3-4 times a month.

Table 3.16 shows the frequency of use of ergogenic support by professional and semi-professional individual sports athletes.

Table3.17. Ergogenic aids usage frequency of individual sports athletes.

Ergogenic Aids	Everydays		2-3 Times a week		3-4 times in a month		Never	
	n	%	n	%	n	%	n	%
Sports Drink	18	17.0	13	12.3	12	11.3	63	59.4
Carbohydrate Powder/Beverage/Gel	7	6.6	10	9.4	10	9.4	79	74.6
Protein Powder	7	6.6	12	11.3	10	9.4	77	72.7
Creatine	6	5.7	10	9.4	10	9.4	80	75.5
Sodium bicarbonate	0	0.0	1	0.9	0	0.0	105	99.1
Caffeine	27	25.5	24	22.6	1	0.9	54	61.0
ß-alanine	0	0.0	5	4.7	0	0.0	101	95.3
Branched-Chain Amino Acid	4	3.8	11	10.3	12	11.3	79	74.6
Hydroxymethyl Butyrate	0	0.0	0	0.0	1	0.9	105	99.1
Glutamine	2	1.9	2	1.9	2	1.9	100	94.3
Multivitamin	9	8.5	7	6.6	0	0.0	90	84.9
Multimineral	3	2.8	1	0.9	0	0.0	102	96.3
Carnitine	1	0.9	0	0.0	2	1.9	103	97.2
Vitamin D	14	13.2	0	0.0	7	6.6	85	80.2
Vitamin C	12	11.3	9	8.5	2	1.9	83	78.3
Probiotic	4	3.8	2	1.9	2	1.9	98	92.4
Magnesium	7	6.6	9	8.5	6	5.7	84	79.2
Iron	4	3.8	1	0.9	2	1.9	99	93.4
B12	6	5.7	4	3.7	6	5.7	90	84.9

Looking at the table, professional and semi-professional individual sports athletes do not use sports drink at the rate of 59.4%, carbohydrate powder/drink/gel at the rate of 74.6%, protein powder at the rate of 72.4%, creatinine at the rate of 75.5%, sodium bicarbonate at the rate of 99.1%, caffeine at the rate of 61%, ß-alanine at the rate of 95.3% branched-chain amino acid at the rate of 74.6%, hydroxymethyl butyrate at the rate of 99.1%, glutamine at the rate of 94.3%, multivitamin at the rate of 84.9%, multimineral at the rate of 96.3%, carnitine at the rate of 97.2%, vitamin D at the rate of 80.2%, vitamin C at the rate of
% 78.3, probiotics at the rate of 92.4%, magnesium at the rate of 79.2%, iron 93.4%, vitamin B12 at the rate of 84.9% at all.

In addition, the most common ergogenic supplements are used sports drink 17% daily, carbohydrate powder/drink/gel 9.4% 2-3 times a week and 3-4 times a month, protein powder 11.3% 2-3 times a week, creatine 9.4% 2-3 times a week and 3-4 times a month, sodium bicarbonate 0.9% 2-3 times a week, caffeine 25.5% every day, ß-alanine 4.7% 2-3 times a week, branched-chain amino acids 11.3% 3-4 times a month, hydroxymethyl butyrate 0.9% 3-4 times a month, glutamine 1.9% every day, 2-3 times a week and 3-4 times a month, multivitamin 8.5% every day, multimineral 2.8% 8 every day, carnitine 1%, 3-4 times a month, vitamin D 13.2% every day, vitamin C 11.3% every day, probiotic 3.8% every day, magnesium 8.5% 2-3 times a week , iron 3.8% every day, vitamin B12 5.7% every day and 3-4 times a month.

4. DISCUSSION

This study was conducted to investigate the association between sports nutrition knowledge level and orthorexia nervosa in professional and semi-professional team sports athletes and individual sports athletes.

214 athletes are included in this study. It is seen that 114 (53.3%) of the participants are female and 100 (46.7%) are male. Those who are professional athletes are 40 (18.7%) and, those who are semi-professional are 174 (81.3%). According to the table 3.1, 50.5% of the participants are engaged in team sports and 49.5% are engaged in individual sports.

According to Table 3.3, 46.3% of team sport athletes, 50.9% of individual sport athletes and 48.6% of all athletes have weak nutritional knowledge. The nutritional knowledge level of 29.7% of team sport athletes, 16.9% of individual sport athletes and 23.4% of all athletes is average. Good nutrition knowledge level is 20.3% for team sport athletes, 16.1% for individual sport athletes and 18.2% for the whole group. Excellent nutrition knowledge level is 3.7% for team sport athletes, 16.1% for individual sport athletes and 9.8% for the whole group.

In a study conducted with boxers when the knowledge levels of the research group in terms of nutritional habits are examined, it is seen that 18.80% of them show insufficient and 81.20% of them have adequate nutrition knowledge (Acar, 2008).

In another study in the literature, it was determined that the nutritional knowledge of the athletes in the basketball branch was insufficient (Süel et al., 2006).

In another study in the literature, the nutritional knowledge levels of 328 athletes in different branches which are both include team sports and individual sports were measured and it was determined that they did not have sufficient nutritional

knowledge (Rosenbloom et al., 2002). The difference between team and individual sports was not given in the study.

In one study conducted on 334 team and individual sports athletes it was found that professional athletes did not have sufficient sports nutrition knowledge level (Yarar et al., 2011). However, in another study it has been reported that 75.6% of individuals who play football as an amateur and 86.7% of those who play football professionally have sufficient nutritional knowledge (Yüksek, 2013). Also, in a study conducted on 151 taekwondo athletes, it was seen that the participants had a good knowledge of sports nutrition (Karadağlı, 2021).

The result of a study conducted on Australian footballers suggested that both male and female athletes need to improve their sports nutrition knowledge since their knowledge is insufficient (Condo et al., 2019).

Researchers in Lebanon sought the nutrition knowledge of basketballers and only 20% of the athletes was found to have adequate nutrition knowledge (Boumosleh et al., 2021). In addition to that in a research on Gaelic footballers it was found that most of the athletes (79.2%) have poor level of sports nutrition knowledge (McCrink et al., 2020).

In a research done on Finnish endurance athletes, it was found that the athletes don't have sufficient knowledge and nutrition education is necessary (Heikkilä et al., 2018).

Looking at the literature it is seen that both team sports and individual sports athletes' knowledge was mostly insufficient. In our research 48.6% of all professional and semi-professional athletes have weak nutritional knowledge. In another study done by Hepyükselen (2021) on 124 elite athletes by using same questioner it was found that only 2.4% of the participants had poor nutritional knowledge and 39.5% had average nutrition which in our study 23.4% of all athletes is average. A study of New Zealand elite athletes found that elite

athletes score better than non-elite athletes (Harrison et al., 1991). This corresponds to the difference between our study and the Hepyükselen's (2021) study. In this study sports nutrition knowledge level was 33.53±11.83 in team sports athletes, 33.45±14.18 in individual sports athletes and 33.49±13.02 in the whole group.

In a study done by Spendlove et al. (2012), on 344 participants team sports and individual sports athletes sports nutrition knowledge level was found similar. There was no significant difference. In our study it was found that Sport Nutrition Knowledge level ($t=0.04$; $p>.05$) mean scores do not differ between professional and semi-professional team sports and professional and semi-professional individual sports athletes (Table 3.6).

According to findings of our study, as the age increases, the training age, and the level of sports nutrition knowledge increase (Table 3.7) as expected. Considering that with increasing age, knowledge and a regular life have a positive effect on nutritional knowledge levels, however when the literature is scanned a study on boxers revealed that the nutritional knowledge of the athletes were evaluated according to their age, it was determined that there was no statistically significant difference between them (Acar, 2008).

The distribution of the answers given by the professional and semi-professional team sports athletes to the statements in the attitude scale towards nutritional ergogenic supplements and the descriptive statistics of the scores they got from the sub-dimensions showed in Table 3.14. and the distribution of the answers and the descriptive statistics of the scores individual sports athletes got from the sub-dimensions of scale showed in Table 3.15.

While the sentences in the benefit sub-dimension were defined as negative behavioural attitudes by the researchers who developed the scale, it has been stated that the sentences in the sub-dimensions of Side Effect and Ethics and in the Natural Nutrition sub-dimensions represent positive behavioural attitudes (Argan and Köse, 2009).

Looking at the table 3.14 it is seen that benefit sub-dimension answers of professional and semi-professional team sports athletes concentrated in the options of Not sure and Agree. Furthermore, the benefit sub-dimension answers of professional and semi-professional individual sports athletes also concentrated in the options of Not sure and Agree (Table 3.15). In terms of benefit sub-dimension all participants' attitudes are similar. Also it was found that in a research sought out by Ercen (2016), on regular fitness club members revealed that answers of 303 participants' answers for benefit sub-dimension of the same scale concentrated in the Not Sure option similar to our results.

In our study when the answers given by the team sports athletes in this sub-dimension are examined, the item that the athletes agree with least is "Nutritional ergogenic support products are used correctly" and the answers of individual sports athletes agree least is "Every athlete should use nutritional ergogenic support products". In the literature the item that the athletes agree with least is "Nutritional ergogenic support products are used correctly" which is same as team sports athletes. The item they agree with most is "Nutritional ergogenic support products are necessary for sports" (Ercen, 2016). The item both team and individual sports athletes and also agree with most is "Nutritional ergogenic support products are necessary for sports".

In the sub dimension of side effects and ethics answers of both team sports and individual sports athletes concentrated in the options Disagree and Not Sure which again similar the answers in literature (Ercen, 2016). The item that the team sports athletes agree with least is "The use of Nutritional ergogenic support products is unethical'' and for individual sports athletes 'The use of nutritional ergogenic support products is illegal''. It is seen that ideas of athletes about ergogenic products are being ethic or illegal is controversial. The item that both team sports and individual sports athletes agree with most is 'Nutritional ergogenic support products have side effects' same as other research in the literature (Ercen, 2016). The most important issue to be discussed regarding this factor is attitudes towards the doping effect. In this regard, the legal and ethical dimensions of the work have been evaluated in this context, also the views on increasing performance in unnatural ways.

It is debated that whether some applications related to sports nutritional supplements are safe (Argan and Köse, 2009; Şenel et al., 2004).

In the sub dimension of natural nutrition answers of both professional and semi-professional team sports athletes are concentrated in the options Disagree and Not sure whereas the answers of individual sports athletes are concentrated in the options Not sure and Agree. In Ercen's (2016) study the answers of participants concentrated in the option Not sure. It can be said that athletes are not sure about if natural nutrition is enough or not. Ergogenic aid products may cause an increase in performance, but the right product, the right time and the right amount should be decided, and professional help should be sought in this regard (Ersoy and Hasbay, 2006).

In the sub dimension of natural nutrition, the item that both professional and semi-professional team and individual sports athletes agree with least is "Nutritional ergogenic support products are only used in bodybuilding sports" and the answers of both team and individual sports athletes agree most is "The same performance can be achieved without the use of nutritional ergogenic support products". Even if the participants don't agree the item 'Natural nutrition is sufficient for the sport' unlike the research in the literature (Ercen, 2016) they believe that they can achieve same performance without the usage of ergogenic aids.

Australian Institute of Sport (AIS) developed classification system for supplements due to their level of benefit. The system categorizes the under four heading. The supplements under group A are the ones which are proven to be beneficial (AIS, 2021).

Sport drinks which are under group A can contribute to improvements in performance. Sport drinks can help athletes improve their performance by maintaining fluid balance along with help to reparation of decreased glycogen in the body. Even though being such a beneficial and crucial 68.5 % of team sports athletes and 59.4% of individual sports athletes stated that they never use sports drinks. When looking at the usage of carbohydrate Powder/Beverage/Gel 66.7% of team sports athletes and

74.6% of individual sports athletes do not use it at all. However, when looking at the literature in one research among professional athletes it was revealed that the most used supplement is sports drink at the rate of 87% (Aljaloud and Ibrahim, 2013).

A study revealed that the most preferred products after protein powders are BCAA, creatine, glutamine, glucosamine and caffeine, respectively (Ercen, 2016). In another study researchers found that frequently used ergogenic aids were whey protein, amino acids, multivitamins, creatine and omega 3 (jawadi et al., 2017). In this research 63% of professional and semi-professional team sports athletes stated that they never use protein powder and 66.7 professional and semi-professional individual sports athletes stated that they never use creatine and only one athlete was using glutamine. In addition, when individual sports athletes are the case, usage of protein powder and creatine is lower 72.7 % and 75.5% of individual sports athletes stated that they never used protein powder and creatine respectively. Also, only 2 individual sports athletes use glutamine.

Intracellular ph regulator B-alanine and sodium bicarbonate which help the extracellular ph regulation in lactic acid pathway (Saunders et al., 2016) are proven to be beneficial for athletes and under the group one supplements of ais are not used by both professional and semi-professional team and individual sports athletes. 97.3% of team sports athletes stated that they never use both supplements also, 99.1% and 95.3% of individual sports athletes stated that they never use B-alanine and sodium bicarbonate respectively.

Caffeine is a stimulant that improves a variety of metabolic and psychological functions. In a research on 600 professional athletes the usage rate of the caffeine is found 55.1% (Frączek et al., 2016). In our study even if the caffeine was found the most used supplement the rate of daily usage in professional and semi-professional individual sports is 25.5% and 19.4% in team sports. Probiotics are well known agents that regulates gastrointestinal symptoms, infections and microbiota. In one study it was revealed that probiotics are beneficial for athletes and it can help post exercise recovery (Leite et al., 2019). However, in our research 92.6% and 92.4% of team and individual sports athletes stated that they never use probiotics respectively.

In one study it was revealed that the individuals using ergogenic aids, 30.5% stated that they used iron, 23.0% vitamin E, and 21.3% calcium (Karimian and Esfahani, 2011). In our study vitamin and mineral usage is also very low (table 3.15 and table 3.16).

It has been known that athletes are more prone to eating disorders. The reason why is more expanded intensity of training, tournaments and social factors. Orthorexia nervosa is a pathological compulsion which characterized with addiction to eat only healthy labelled food and substantially it is about behaviours rather than food.

Previous researches put forward that eating disorders are frequent in athletes (Bratland-Sanda and, Sundgot-Borgen, 2013; Joy et al.,2016; Sundgot-Borgen and Torstveit ,2004). The prevalence of ON in sports is unknown. Only a few researchers have discovered that ON occurs more frequently in athletes than in non-athletes (Clifford and Blyth, 2019; Segura-Garcia et al., 2012).

A research on athletes has been revealed that 28% of the females and 30% of males have orthorectic tendency in other words had lower than 35 in the orthorexia scale (Segura-Garcia et al., 2012). In addition to this 76% of the participants of another study on students had orthorectic tendencies (Clifford and Blyth, 2019). Furthermore, it has sought that 72.8% of the athletes had less than 40 scale score (Bert et al.,2019).

Surała et al. (2020), presented that 88.3% of total 273 participants of elite athletes had lower scores than 40 in ORTHO-15 scale likewise the mean scores ofthe scale for all participants was 35.3 ± 3.5.

Further to that in our study 151 of the total 214 participants have lower and equal to score 40. It can be said that 70.5% of the total professional and semi-professional participants of this study have orthorectic tendencies. This result supports other findings in the literature mentioned above. At the same time orthorexia scale mean score is 38.40±4.58 for team sports athletes, 36.37±5.85 for individual sports athletes and 37.40±5.34 for all athletes.

Athletes who participate in sports where having a low body mass is seen as favoured for performance, along with weight class sports and aesthetic sports, are more prone to participate in pathological eating behaviours (Joy et al., 2016).Nonetheless when the literature is scanned there are researches which conflict. According to one study which divided their participants 3 subcategories which are endurance, weight dependent sports and other sports (High-Intensity Intermittent Efforts and sprint) revealed that there is no significant difference of orthorexia tendencies in terms of sport type (Surała et al., 2020). In addition to this no significant difference was found in a study between weight-dependent sports which are individual sports and other athletes (Clifford and Blyth, 2019).

Regardless of that our study found out that the level of orthorexia tendencies in professional and semi-professional team sports athletes was found to be significantly higher than in professional and semi-professional individual sports athletes was shown in table 3.6. ($t=2.83$; $p<.05$).

When looking at literature few articles showed that weekly training hours are related to orthorexia tendencies. It was revealed that higher training hours associated to higher orthorexia tendencies (Bert et al., 2019; Clifford and Blyth, 2019; Surała et al., 2020). On the other hand, in our study weekly training hours are 12.15±3.69 hours for team sport athletes, 15.48±5.13 hours for individual sport athletes and 13.80±4.75 hours for both groups which doesn't correspond to those researches. Yet it should be emphasized that most of the athletes in this study are semi-professional.

In the literature there are researches revealed different kind of association between BMI and orthorexia. In a study conducted by Aksoydan and Camcı (2009), with Turkish performance artists, it was seen that there was no statistically significant relationship between ON tendency and age and BMI. In addition to this another research on Hungarian university students put forward that there was no statistically significant relationship found between the BMI values of the participants and ON tendencies (Varga et al., 2017). In spite of this in a study conducted in 2019 among Italian, Spanish and Polish university students, it was reported that the tendency for orthorexia nervosa increased with the increase in BMI (Gramaglia et al., 2019).

Another study done on nutrition students and experts showed that it was determined that the tendency to ON increases as BMI increases (Abdullah et al., 2020). Above all BMI is never considered as an accurate tool for athletes' population due to higher muscle mass of them since it can distinguish the difference between lean body mass and fat mass. On the other hand, one research on nutrition students used bioelectrical impedance, and another on elite athletes used dual-energy X-ray absorptiometry (DXA) which gives the most accurate data of body composition. Nevertheless, both researches acknowledged that there was no relationship between ON tendency and body composition (Agopyan et al.,2019; Surała et al., 2020). In this study no relationship was sought between BMI and orthorexia nervosa tendency.

When the literature is scanned one study on boxers found out that there is no statistically significant difference in target groups in terms of the association between age and nutritional knowledge. This shows that the age differences of the athletes do not have a significant effect on their nutritional knowledge levels. Considering that knowledge accumulation and a regular life have a positive effect on nutritional knowledge levels with increasing age, it was expected that the older age group will be more knowledgeable. However, the results that study do not support this view (Acar, 2008).

In this research it was revealed that as the age of the athletes increases the level of sports nutrition knowledge also increases. In the meantime, in team sports athletes as the age and sports nutrition knowledge level increases, orthorexia tendency also increases. On the other side in individual sports athletes as the age and sports nutrition knowledge level increases the tendency of orthorexia decreases.

When the result of sports nutrition knowledge level is taken into consideration, even if the poor knowledge percentage is higher in individual sports (50.9%) than team sports athletes (46.3%), it should be emphasized that the percentage of ones who score the best in the questioner is higher in individual sports athletes (16.1%) than team sports athletes (3.7%).

Nutrition and sports cannot be thought as a separate phenomenon. In order to achieve the best performance all athletes aware of the fact that adequate and balanced nutrition is the key. Hence it is normal for athletes to concern their nutrition more than the general population. It is not necessarily having to be related to eating disorders. Using only ORTO-15 scale might not be the correct diagnose tool. Psychological background and other psychological illness tendencies should be taken into consideration. Yet ORTO-15 scale is the most common tool to determine ON.

For sub population like athletes which proper nutrition is crucial new and more detailed tools are necessary. The result of other studies in the literature support this outcome (Segura-Garcia et al., 2012; Surała et al., 2020).

5. CONCLUSION AND RECOMMENDATIONS

This research has done on 108 professional and semi-professional team sports athletes and 106 professional and semi-professional individual sports athletes totally 214 participants. 114 of the participants were female and 100 of them were male and only 40 participants were professional. The results obtained from the research are summarized below:

- The average age for team sports athletes is 22.19±2.16 and 22.59±2.11 for individual sports athletes. The mean values of BMI are 21.94±1.92 for team sport athletes, 22.36±2.33 for individual sport athletes.
- Weekly training hours are 12.15±3.69 hours for team sport athletes, 15.48±5.13 hours for individual sport athletes and 13.80±4.75 hours for both groups.
- 46.3% of team sport athletes, 50.9% of individual sport athletes and 48.6% of all athletes have poor nutritional knowledge. Excellent nutrition knowledge level is 3.7% for team sport athletes, 16.1% for individual sport athletes and 9.8% for the whole group. Sports nutrition knowledge mean level is 33.53±11.83 in team sports athletes, 33.45±14.18 in individual sports athletes and 33.49±13.02 in the whole group.
- Orthorexia scale mean score is 38.40±4.58 for team sports athletes, 36.37±5.85 for individual sports athletes and 37.40±5.34 for all athletes
- Attitude Scale for Nutritional Ergogenic Support Products scales sub-dimensions; Benefit sub-dimension mean score is 3.71±0.79 for team sports athletes, 3.50±0.87 for individual sports athletes and 3.61±0.84 for all athletes. Side effects and ethics sub-dimensions were 2.62±0.73 in team sports athletes, 2.75±0.77 in individual sports athletes, and 2.68±0.75 in the whole group. The mean scores of the natural nutrition sub-dimension are 2.85±0.80 for team sports athletes, 2.92±0.83 for individual sports athletes, and 2.88±0.82 for all athletes.
- Attitude Scale for Nutritional Ergogenic Support Products sub-dimensions' natural nutrition ($t=-0.65$; $p>.05$), side effects and ethics ($t=-1.30$; $p>.05$), benefit ($t=1.78$; $p>.05$) and Sport Nutrition Knowledge level ($t=0.04$; $p>.05$) mean scores do not differ between team sports and individual sports athletes.

- The level of orthorexia in team sports athletes was found to be significantly higher than in individual athletes ($t=2.83$; $p<.05$).
- For team sports athletes According to these findings, as the age increases, the training age, and the level of sports nutrition knowledge increase, and as the level of sports nutrition knowledge increases, the level of orthorexia increases.
- For individual sports athletes as the training age and the level of orthorexia increase, the level of sports nutrition knowledge decreases. As the age of the athlete increases, the level of sports nutrition knowledge increases.
- For team sports athletes there are positive and significant correlations between the sub-dimension of natural nutrition and side effects and ethics in the attitude scale towards nutritional ergogenic supports.
- For individual sports athletes the correlation between the sub-dimensions of side effects and ethics and natural nutrition in the attitude scale towards nutritional ergogenic support is positive and significant.

Even the ergogenic aids with proven effectiveness have a very low usage rate. Due to the low rate of nutrition knowledge of the athletes, they could not fully grasp the importance of the use of ergogenic support. Trainers and athletes should be informed by sports nutritionist.

Beside general sports nutrition, they should be informed, and federations and sports clubs carry out training programs in coordination with each other on the basis of branches regarding the use of ergogenic support to clarify which are effective and which are not. Nutrition training to be given by sports nutritionist will increase awareness in this field, bring success in sports and prevent health problems due to unconscious use of ergogenic aids.

Nutrition knowledge level is related to food selection and if the nutritional knowledge level of the athletes increases, it will affect the food selection in the future. After the nutrition education with regular nutrition trainings and regular knowledge level checks, the nutritional status of the athletes should be evaluated in certain periods

and it should be ensured that the nutritional knowledge is transformed into behaviours with repeated trainings.

After proper nutrition educations, athletes should be informed about risk factors and dangers of orthorexia nervosa. Practical application about food selection should be done in order to help further food selection and prevent fear of eating unhealthy food.

If female athletes continue to not use sufficient amount of important minerals such as calcium, iron, sodium and potassium, which are vital for athletes and healthy individuals, deficiencies of minerals can be seen and undesirable health problems such as iron deficiency and osteoporosis may be encountered, as well as damaging their professional careers. It is emerged that all athletes and especially females should be informed about essential mineral usage.

SUMMARY

Comparison of Sports Nutrition Knowledge, Supplement Usage and Orthorexia Tendencies Between Different Sport Branches.

Orthorexia nervosa (ON) refers to the pathological condition associated with the consumption of healthy food. Orthorexia nervosa is an important type of eating disorder in which over-occupation of foods quality, purity and healthy eating is at the forefront. It has been observed that over-dealing with strict rules on healthy eating takes up most of the time of these patients and may lead to deterioration of social functions. Orthorexia nervosa symptoms are more common especially in people who are obsessed with staying at a certain weight, models, dancers, gymnasts, physicians, dietitians, individuals with anxiety, obsessive-compulsive individuals, and individuals who give excessive importance to body image. The contradiction between perceived body type by society according to sport branches and own body of an athlete creates pressure on athletes and causes eating disorders. For this reason, eating disorders are observed with a higher prevalence in weight, endurance and aesthetic sports. Trainers, athletes and families need to be informed on the risk factors associated with eating disorders. In order to prevent eating disorders, athletes need to receive nutritional education support that improves their health and performance. In athletes, the risk of developing eating disorders is less if weight loss is provided gradually and under controlled and expert supervision. The purpose of this thesis is to find out if any different exist between team sports athletes and individual sports athletes in terms of orthorexia nervosa tendency and in terms of sports nutrition knowledge. As well as to reveal the association between sport nutrition knowledge level and orthorexia tendency if it is the case. Furthermore, to search connection between age of the athletes and sports nutrition knowledge level. This research has done on 108 team sports athletes and 106 individual sports athletes totally 214 participants. Participants filled survey form consist of varied sections to evaluate orthorexia tendency, ergogenic supplement usage, and sport nutrition knowledge level. The level of orthorexia in team sports athletes was found to be significantly higher than in individual athletes ($t=2.83$; $p<.05$). For team sports athletes According to these findings, as the age increases, the training age, and the level of sports nutrition knowledge increase, and as the level of sports nutrition knowledge increases, the level of orthorexia increases. For individual sports athletes as the training age and the level of orthorexia increase, the level of sports nutrition knowledge decreases. As the age of the athlete increases, the level of sports nutrition knowledge increases. For team sports athletes there are positive and significant correlations between the sub-dimension of natural nutrition and side effects and ethics in the attitude scale towards nutritional ergogenic supports.

Keywords: Competitive sport, nutritional knowledge, orthorexia, sports nutrition.

ÖZET

Farklı Spor Dalları Arasında Spor Beslenme Bilgisi, Takviye Kullanımı ve Ortoreksiya Eğilimlerinin Karşılaştırılması

Ortoreksiya nervoza (ON), sağlıklı gıda tüketimi ile ilişkili patolojik durumu ifade eder. Ortoreksiya nervoza, gıdaların kalitesi, saflığı ve sağlıklı beslenmenin aşırı tüketilmesinin ön planda olduğu önemli bir yeme bozukluğu türüdür. Sağlıklı beslenme konusunda katı kurallarla gereğinden fazla uğraşmanın bu hastaların çoğu zamanını aldığı ve sosyal fonksiyonların bozulmasına yol açabileceği gözlemlenmiştir. Ortoreksiya nervoza belirtileri özellikle belirli bir kiloda kalma takıntısı olan kişilerde, sporcularda, mankenlerde, dansçılarda, jimnastikçilerde, doktorlarda, diyetisyenlerde, anksiyetesi olanlarda, obsesif-kompulsif bireylerde ve beden imajına aşırı önem veren kişilerde daha sık görülmektedir. Spor branşlarına göre toplum tarafından algılanan beden tipi ile sporcunun kendi bedeni arasındaki çelişki, sporcular üzerinde baskı oluşturmakta ve yeme bozukluklarına neden olmaktadır. Bu nedenle siklet, dayanıklılık ve estetik sporlarda yeme bozuklukları daha sık görülmektedir. Antrenörler, sporcular ve ailelerin yeme bozuklukları ile ilişkili risk faktörleri konusunda bilgilendirilmesi gerekmektedir. Yeme bozukluklarını önlemek için sporcuların sağlıklarını ve performanslarını iyileştiren beslenme eğitim desteği almaları gerekmektedir. Sporcularda, kontrollü ve uzman gözetiminde kademeli olarak kilo kaybı ve alımı sağlanırsa yeme bozukluğu gelişme riski daha azdır. Bu tezin amacı, takım sporları yapan sporcular ile bireysel spor yapan sporcular arasında ortoreksiya nervoza eğilimi ve sporcu beslenme bilgisi açısından farklılık olup olmadığını ortaya çıkarmaktır. Bunun yanı sıra spor beslenme bilgi düzeyi ile ortoreksiya eğilimi arasındaki var olması olası ilişkiyi de ortaya koymak ve ayrıca sporcuların yaşları ile sporcu beslenme bilgi düzeyleri arasındaki ilişkiyi araştırmaktır.Bu araştırma 108 takım sporcusu ve 106 bireysel sporcu olmak üzere toplam 214 katılımcı üzerinde yapılmıştır. Katılımcıların doldurdukları anket formu, ortoreksiya eğilimi, ergojenik destek kullanımı ve spor beslenme bilgi düzeyini değerlendirmek için çeşitli bölümlerden oluşmaktadır. Takım sporu yapanlarda ortoreksiya düzeyi bireysel sporculara göre anlamlı derecede yüksek bulunmuştur ($t=2,83$; $p<,05$). Bulgulara göre takım sporcularında yaş arttıkça antrenman yaşı ve sporcu beslenme bilgi düzeyi artmaktadır ve sporcu beslenme bilgi düzeyi arttıkça da ortoreksiya eğilimi artmaktadır. Bireysel sporcularda antrenman yaşı ve ortoreksiya düzeyi arttıkça sporcu beslenme bilgi düzeyi düşmektedir. Genel olarak sporcunun yaşı arttıkça sporcu beslenme bilgi düzeyi de artmaktadır. Takım sporu oyuncuları için ergojenik desteklere yönelik tutum ölçeğinde doğal beslenme alt boyutu ile yan etkiler ve etik beslenme arasında pozitif ve anlamlı ilişki vardır.

Anahtar Sözcükler: Beslenme bilgisi, ortoreksiya, rekabet sporları, sporcu beslenmesi.

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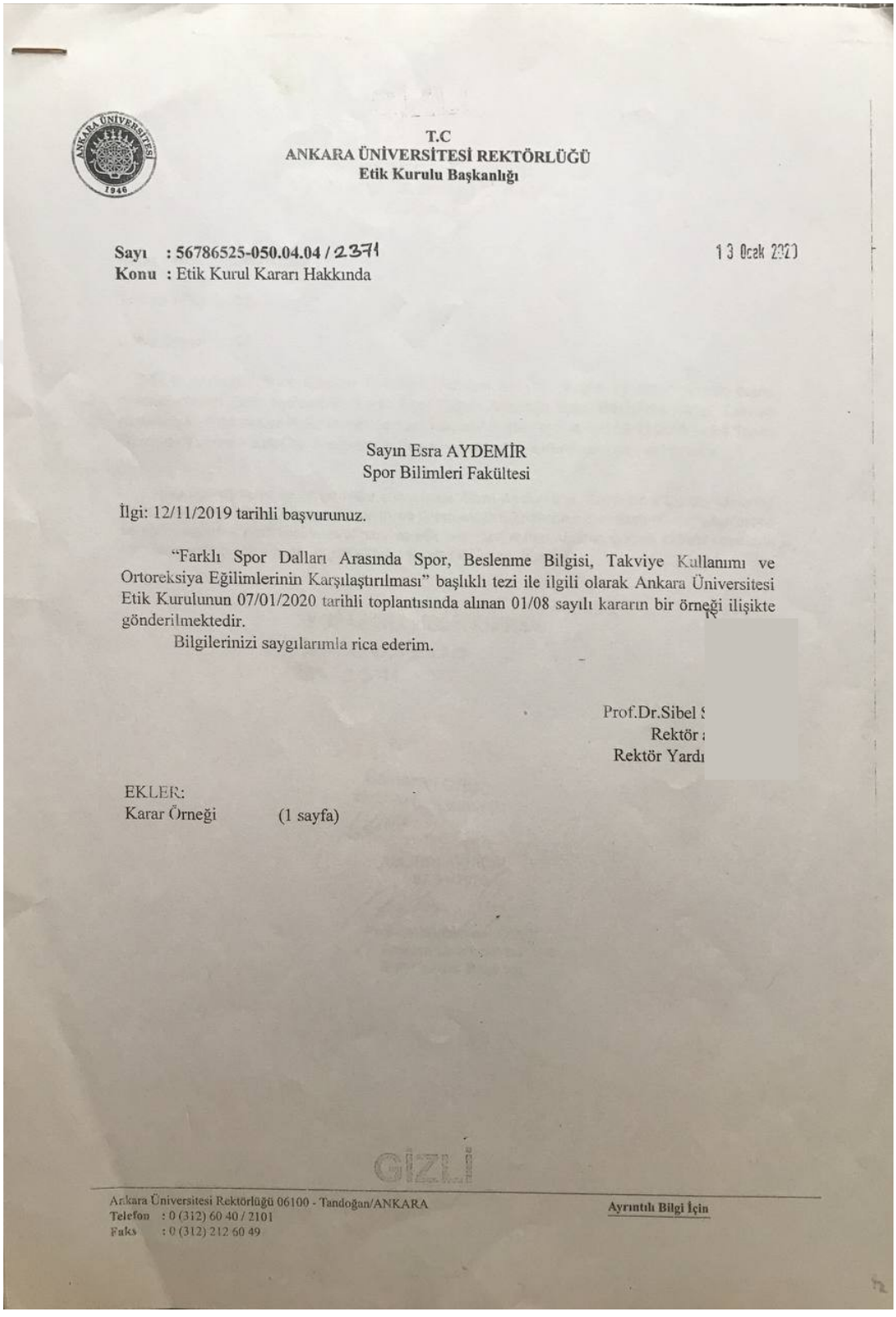
APPENDIX

1. Ethics Committee Approval



T.C
ANKARA ÜNİVERSİTESİ REKTÖRLÜĞÜ
Etik Kurulu Başkanlığı

Sayı : 56786525-050.04.04 / 2371
Konu : Etik Kurul Kararı Hakkında

13 Ocak 2020

Sayın Esra AYDEMİR
Spor Bilimleri Fakültesi

İlgi: 12/11/2019 tarihli başvurunuz.

"Farklı Spor Dalları Arasında Spor, Beslenme Bilgisi, Takviye Kullanımı ve Ortoreksiya Eğilimlerinin Karşılaştırılması" başlıklı tezi ile ilgili olarak Ankara Üniversitesi Etik Kurulunun 07/01/2020 tarihli toplantısında alınan 01/08 sayılı kararın bir örneği ilişikte gönderilmektedir.

Bilgilerinizi saygılarımla rica ederim.

Prof.Dr.Sibel
Rektör
Rektör Yardı

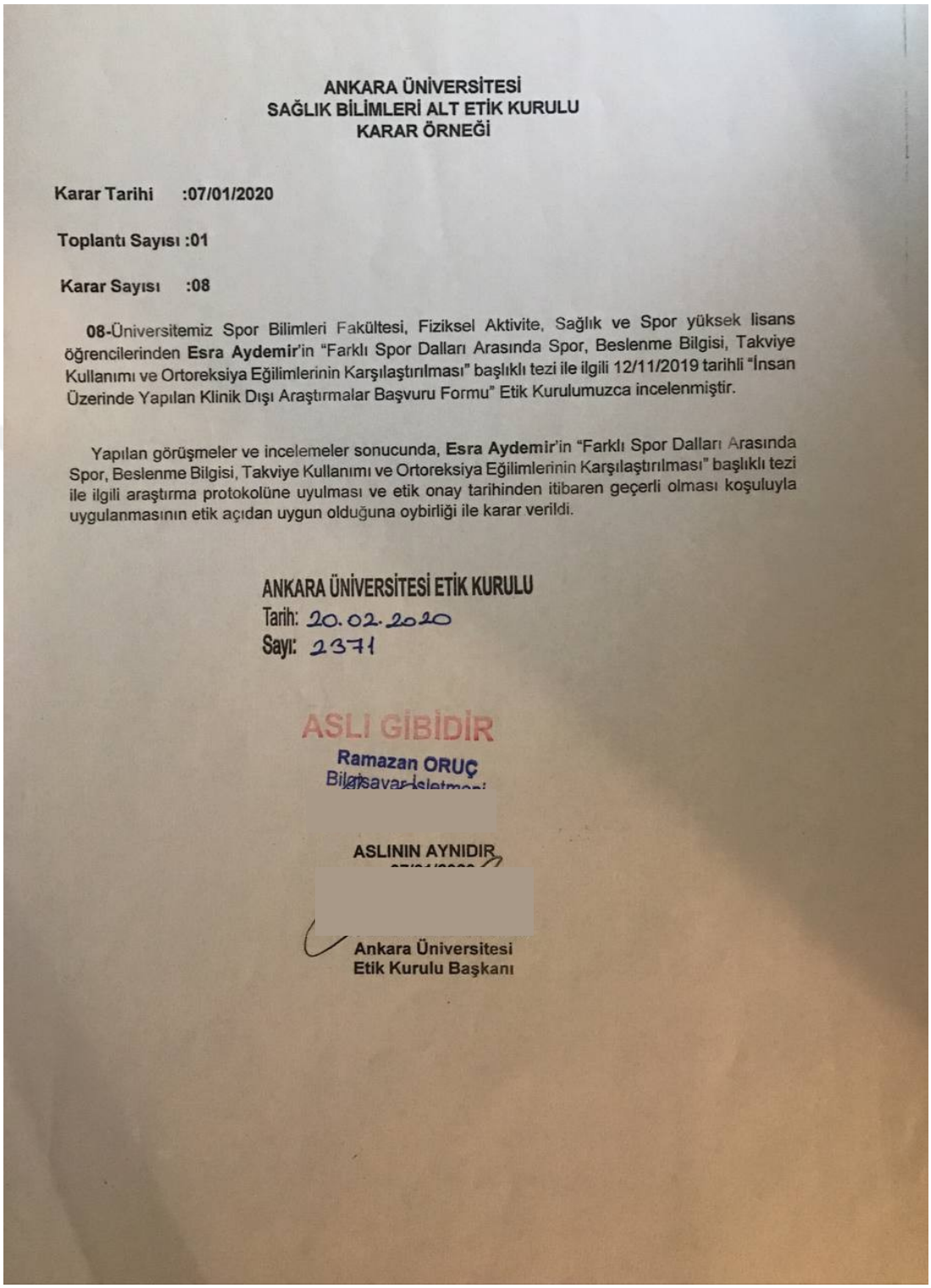
EKLER:
Karar Örneği (1 sayfa)

GİZLİ

Ankara Üniversitesi Rektörlüğü 06100 - Tandoğan/ANKARA
Telefon : 0 (312) 60 40 / 2101
Faks : 0 (312) 212 60 49

Ayrıntılı Bilgi İçin

1. Ethics Committee Approval



ANKARA ÜNİVERSİTESİ
SAĞLIK BİLİMLERİ ALT ETİK KURULU
KARAR ÖRNEĞİ

Karar Tarihi :07/01/2020

Toplantı Sayısı :01

Karar Sayısı :08

08-Üniversitemiz Spor Bilimleri Fakültesi, Fiziksel Aktivite, Sağlık ve Spor yüksek lisans öğrencilerinden **Esra Aydemir**'in "Farklı Spor Dalları Arasında Spor, Beslenme Bilgisi, Takviye Kullanımı ve Ortoreksiya Eğilimlerinin Karşılaştırılması" başlıklı tezi ile ilgili 12/11/2019 tarihli "İnsan Üzerinde Yapılan Klinik Dışı Araştırmalar Başvuru Formu" Etik Kurulumuzca incelenmiştir.

Yapılan görüşmeler ve incelemeler sonucunda, **Esra Aydemir**'in "Farklı Spor Dalları Arasında Spor, Beslenme Bilgisi, Takviye Kullanımı ve Ortoreksiya Eğilimlerinin Karşılaştırılması" başlıklı tezi ile ilgili araştırma protokolüne uyulması ve etik onay tarihinden itibaren geçerli olması koşuluyla uygulanmasının etik açıdan uygun olduğuna oybirliği ile karar verildi.

ANKARA ÜNİVERSİTESİ ETİK KURULU
Tarih: 20.02.2020
Sayı: 2371

ASLI GİBİDİR
Ramazan ORUÇ
Bilgisayar İşletmeni

ASLININ AYNIDIR

Ankara Üniversitesi
Etik Kurulu Başkanı

2. Informed Consent Form

ARAŞTIRMA AMAÇLI ÇALIŞMA İÇİN
BİLGİLENDİRİLMİŞ ONAM FORMU
(Araştırmacının Açıklaması)

Sorumlu araştırmacı Doç. Dr. Fırat Akça danışmanlığında, farklı spor dallarındaki sporcuların beslenme bilgi düzeylerini karşılaştırmaya, takviye tercihlerini ve kullanım sıklıklarını belirlemeye ve ortoreksiya eğilimlerini araştırmaya yönelik yüksek lisans tezi yapmaktayım. Araştırmanın ismi "Farklı Spor Dalları Arasında Spor Beslenme Bilgisi, Takviye Kullanımı Ve Ortoreksiya Eğilimlerinin Karşılaştırılması"dır.

Sizin de bu araştırmaya katılmanızı öneriyorum. Ancak hemen söyleyeyim ki çalışmaya katılım gönüllülük esasına dayalıdır. Kararınızdan önce araştırma hakkında sizi bilgilendirmek istiyorum. Bu bilgileri okuyup anladıktan sonra araştırmaya katılmak isterseniz formu imzalayınız. **Çalışma tamamen gönüllülük esasına dayanır ve çalışmaya katılan bireylere maddi bir ödeme yapılmaz.**

Bu araştırmayı yapmak istememizin nedeni, sporcularda beslenme bilgi düzeyini ölçmek, ergojenik takviye kullanımlarını incelemek, antrenman ve müsabaka sırasında ortaya çıkan beslenme kaynaklı sorunların çözümüne ışık tutmak, sağlıklı beslenme takıntısı bir diğer ifadeyle ortoreksiya eğilimini tespit etmek ve önlemeye yönelik uygulamalar geliştirmektir. Bu çalışmaya katılımınız araştırmanın başarısı için önemlidir.

Eğer araştırmaya katılmayı kabul ederseniz, Esra AYDEMİR tarafından genel bilgilerinizi, spor bilgilerinizi, ergojenik takviyelere yönelik tutumlarınızı ve tüketim sıklığınızı, ortoreksiya eğiliminizi, yeme tutumlarınızı ve sporcu beslenme bilgi düzeyinizi değerlendirmek amacıyla anket formu doldurulacaktır. Araştırmada sizden elde edilen veriler yalnızca bu çalışmada kullanılacaktır. Anket formu yedi bölümden oluşmaktadır. İlk bölüm katılımcıların sosyodemografik özelliklerini (yaş, cinsiyet) toplamak için genel bilgi sorularını içerir. İkinci bölüm, spora kaç yaşında başladıklarını, mesleki kariyer sürelerini, milli takımda bulunma sürelerini, haftada kaç gün ve kaç antrenman yaptıklarını vb. öğrenmek amacıyla sorulmuş spor bilgisi sorularını içerir. Üçüncü bölüm ergojenik destek kullanımı ile ilgili soruları içerir. Dördüncü bölümde Orto-15 testi, beşinci bölümde Sporcu Beslenme Bilgisi Ölçeği yer almaktadır. Anketin yanıtlanması yaklaşık 30-35dakika alacaktır. Anket içeriğinde rahatsızlık verebilecek herhangi bir soru bulunmamaktadır. Anketler Ankara Üniversitesi'nde yanıtlanacaktır.

2. Informed Consent Form

(Katılımcının Beyanı)

Sayın Esra AYDEMİR tarafından yetişkin bireylerde bir araştırma yapılacağı belirtilerek bu araştırma ile ilgili yukarıdaki bilgiler bana aktarıldı. Bu bilgilerden sonra böyle bir araştırmaya "katılımcı" olarak davet edildim.

Eğer bu araştırmaya katılırsam araştırıcı ile aramda kalması gereken bana ait bilgilerin gizliliğine bu araştırma sırasında da büyük özen ve saygı ile yaklaşılacağına inanıyorum. Araştırma sonuçlarının eğitim ve bilimsel amaçlarla kullanımı sırasında kişisel bilgilerimin ihtimamla korunacağı konusunda bana yeterli güven verildi.

Çalışmanın yürütülmesi sırasında herhangi bir sebep göstermeden araştırmadan çekilebilirim (*Ancak araştırmacıları zor durumda bırakmamak için araştırmadan çekileceğimi önceden bildirmemim uygun olacağının bilincindeyim).* Ayrıca araştırmacı tarafından araştırma dışı tutulabilirim.

Araştırma için yapılacak harcamalarla ilgili herhangi bir parasal sorumluluk altına girmiyorum. Bana da bir ödeme yapılmayacaktır. Araştırma sırasında veya araştırma ile ilgili herhangi bir sorun ile karşılaştığımda; herhangi bir saatte, Esra AYDEMİR'i *numaralı telefondan arayabileceğimi biliyorum.*

Bu araştırmaya katılmak zorunda değilim ve katılmayabilirim. Araştırmaya katılmam konusunda zorlayıcı bir davranışla karşılaşmış değilim. Eğer katılmayı reddedersem, bu durumun araştırıcı ile olan ilişkime herhangi, bir zarar getirmeyeceğini de biliyorum.

Bana yapılan tüm açıklamaları ayrıntılarıyla anlamış bulunmaktayım. Kendi başıma belli bir düşünme süresi sonunda adı geçen bu araştırma projesinde "katılımcı" olarak yer alma kararını aldım. Bu konuda yapılan daveti büyük bir memnuniyet ve gönüllülük içerisinde kabul ediyorum.

İmzalı bu form kağıdının bir kopyası bana verilecektir.

Katılımcı	**Görüşme Tanığı**
Adı soyadı:	Adı soyadı:
Adres:	Adres:
Tel:	Tel:
İmza:	İmza:

3. Survey Form

ANKET FORMU

Anket No.

I. GENEL BİLGİLER

1. Cinsiyeti: Kadın ☐ Erkek ☐

2. Doğum Tarihi: …/…/…

3. Eğitim Düzeyi: İlkokul ☐ / Orta okul ☐ / Lise ☐/ Üniversite ☐ /Lisansüstü ☐

4. Boyunuz (cm):..... Kilonuz(kg): .....

II. SPOR BİLGİLERİ

12. Spor branşınız nedir?

.....
....

13. Spora kaç yaşında başladınız?

.....
....

14. Haftada kaç gün ve kaç saat antrenman yapıyorsunuz?

.....gün .....saat

15. Milli takımlar kadrosunda hiç bulundunuz mu? Hangi düzeyde bulundunuz?

Evet ☐ **Hayır** ☐ **Düzey:** …….

III. BESİNSEL ERGOJENİK DESTEK ÜRÜNLERİNE YÖNELİK TUTUM ÖLÇEĞİ

Aşağıdaki ölçekte her biri 5 seçenekten oluşan 13 ifade bulunmaktadır. Lütfen size uygun seçeneği, ilgili ifadenin karşısında bulunan kutucuğa 'X' işareti koyarak belirtiniz.

	Kesinlikle katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle katılıyorum
1. Sporcu besin destekleri spor için gereklidir.					
2. Sporcu besin destekleri performansı artırır					
3. Sporcu besin destekleri doğru kullanılmaktadır.					
4. Her sporcunun besin desteği kullanması gerekir.					
5. Sporcu besin destekleri rahatça temin edilebilmeli					
6. Sporcu besin destekleri doping etkisi yaratır					

7. Sporcu besin desteklerinin yan etkisi vardır.						
8. Sporcu besin desteklerinin kullanımı yasal değildir.						
9. Sporcu besin desteklerinin kullanımı ahlaki değildir.						
10. Sporda doğal beslenme yeterlidir.						
11. Sporcu besin destekleri sadece vücut geliştirme sporunda kullanılır.						
12. Sporcu besin desteklerini kullanmadan da aynı performans sağlanabilir.						
13. Sporcu besin destekleri psikolojik bağımlılık yapar						

Son üç aydaki ergojenik destek/supleman tüketiminizi düşünerek aşağıdaki besinleri tüketim sıklığınızı ve miktarınızı belirtiniz.

Ergojenik Destekler/Suplemanlar	Hergün	Haftada	Ayda	Hiç	Miktar
Su					
Sporcu İçeceği (İsim/Marka.....)					
Karbonhidrat Tozu/ İçeceği/ Jeli (İsim/Marka.....)					
Protein Tozu (İsim/Marka.....)					
Kreatin (İsim/Marka.....)					
Sodyum bikarbonat (İsim/Marka.....)					
Kafein (İsim/Marka.....)					
β-alanin (İsim/Marka.....)					
Dallı Zincirli Aminoasit (BCAA-DZAA) (İsim/Marka.....)					
HidroksimetilBütirat (HMB) (İsim/Marka.....)					
Glutamin					
Multivitamin (İsim/Marka.....)					

Multimineral (İsim/Marka.....)					
Karnitin (İsim/Marka.....)					
D vitamini (İsim/Marka.....)					
C Vitamini (İsim/Marka.....)					
Probiyotik (İsim/Marka.....)					
Magnezyum (İsim/Marka.....)					
Demir (İsim/Marka.....)					
B12 (İsim/Marka.....)					

Ergojenik destek/supleman önerilerinizi kimden alıyorsunuz?

……
……

IV. ORTO-15 TESTİ

Bu anket sizin yeme alışkanlıklarınızla ilgilidir. Lütfen her bir soruyu dikkatlice okuyunuz ve size uygun gelen kutucuğa 'X' işareti koyunuz. Teşekkürler.

SORULAR	Her Zaman	Sık Sık	Bazen	Hiçbir Zaman
1. Yemek yerken yediklerinizin kalorisine dikkat eder misiniz?				
2. Çeşitli yiyeceklerin olduğu bir yerde yiyecek seçmek durumunda kalırsanız kararsızlık yaşar mısınız?				
3. Son üç ay içerisinde besinler konusunda endişelendiğiniz oldu mu?				
4. Sağlığınızla ilgili endişeleriniz besin seçiminizi etkiler mi?				
5. Yemeğinizin sağlıklı olması sizin için lezzetli olmasından daha mı önemlidir?				
6. Daha sağlıklı, daha taze besinler satın almak için daha fazla para harcamak ister misiniz?				

7. Sağlıklı beslenme ile ilgili düşünceler sizi günde üç saatten fazla meşgul eder mi?				
8. Sağlıksız olduğunu düşündüğünüz besinleri yediğiniz oldu mu?				
9. Sizce, ruhsal durumunuz yeme düzeninizi etkiler mi?				
10. Besinler içerisinde sadece sağlıklı olanları tüketmek kendinize olan güveninizi artırır mı?				
11. Uyguladığınız beslenme tipi yaşam tarzınızı değiştirir mi? (Dışarıda yeme sıklığı, arkadaşalr vb. açıdan)				
12. Sağlıklı beslenmenin dış görünümünüzü daha iyi hale getirebileceğini düşünür müsünüz?				
13. Sağlıksız beslendiğinizde kendinizi suçlu hisseder misiniz?				
14. Piyasada sağlıksız besinlerin de satıldığını düşünür müsünüz?				
15. Son zamanlarda yemeklerinizi özellikle tek başına yemeği mi tercih edersiniz?				

V. SPORCU BESLENMESİ BİLGİSİ ÖLÇEĞİ

1. Aşağıdakiler ağırlık kontrolü ile ilgili ifadelerdir. Lütfen; katılıyorum, katılmıyorum ya da emin değilim seçeneklerinden birini seçiniz.

	Katılıyorum	Katılmıyorum	Emin Değilim
1.1 Dayanıklılık sporlarında, mümkün olan en düşük ağırlıkta olmak uzun vadede performans için faydalıdır			
1.2 Sadece kas artışı istendiğinde gerekli olan temel diyet değişikliği diyetteki protein miktarını arttırmaktır.			

2. Kas artışını hedefleyen bir sporcu için hangisinin en iyi öğle yemeği seçeneği olduğunu düşünüyorsunuz? Sabahn antrenmanı olduğunu, sabah kahvaltısı ile öğle öncesi ara öğününü tükettiğini varsayalım.

o Bir kas artırıcı (kütle artırıcı) protein shake ve 3-4 çırpılmış yumurta

o Yağsız kıyma et ve sebze soslu makarna ayrıca, meyve, yoğurt ve fındıktan yapılmış bir tatlı

o Büyük bir parça tavuk ızgara ve salata (marul, salatalık, domates)

o Büyük bir biftek ve kızartılmış yumurta

o Emin değilim

3. Günde bir ile üç saat kadar orta ile yüksek yoğunluklu bir dayanıklılık antrenman programı yürüten bir sporcu için önerilen karbonhidrat miktarının ne kadar olduğunu düşünüyorsunuz?

o Vücut ağırlığının kg 'ı başına günde 1 - 3 g karbonhidrat

o Vücut ağırlığının kg' ı başına günde 5 - 8 g karbonhidrat

o Toplam günlük kalori alımının% 15 - 25'i

o Toplam günlük kalori alımının% 75 - 85'i

o Emin değilim

4. Sizce aşağıdaki yiyeceklerin karbonhidrat içeriğiyüksek veya düşük müdür?

	Yüksek	Düşük	Emin Değilim
4.1 1 Orta boy Muz			
4.2 1/2 bardak pişmiş Kinoa			
4.3 1 bardak fırında pişmiş fasulye			

5. Aşağıdaki ifadeler yağ ile ilgilidir. Lütfen, katılıyorum, katılmıyorum veya emin değilim seçeneklerinden birini seçiniz.

	Katılıyorum	Katılmıyorum	Emin Değilim
5.1. Yağ, vücut tarafından bağışıklık fonksiyonuyla ilgili hücre zarları ve molekülleri yapmak için gereklidir			
5.2. Sporcular günde 20 gramdan fazla yağ tüketmemelidir.			
5.3. Egzersiz yoğunluğu arttığında, enerji için yakılan yağın yüzdelik (%) oranı da artar.			
5.4. Düşük yoğunluklu egzersiz yaparken yağ, enerji ihtiyacının tümünü karşılar.			

6. Bu yiyeceklerin yüksek ya da düşük yağlı olduğu konusunda ne düşünüyorsunuz?

	Yüksek	Düşük	Bilmiyorum
1/2 Bardak Süzme Peynir			

7. Aşağıdaki ifadeler protein ile ilgilidir. Lütfen katılıyorum, katılmıyorum veya emin değilim seçeneklerinden birini seçiniz.

	Katılıyorum	Katılmıyorum	Emin Değilim
7.1.Protein, egzersiz sırasında kasların kullandığı enerjinin ana kaynağıdır			
7.2. Vejetaryen sporcular protein takviyeleri kullanmadan protein gereksinimlerini karşılayabilirler.			
7.3. Tek bir seferde protein emilimi sınırlıdır			
7.4. Yeterli enerji sağlayan dengeli bir diyet, tüm protein ihtiyacını karşılamalar.			

8. 100 kg vücut ağırlığına sahip iyi antrenmanlı bir direnç sporcusunun, protein ihtiyacına en yakın olan protein miktarı hangisidir?

o Günde 75 g

o Günde 130 g

o Günde 250 g

o Mümkün olduğu kadar protein almalıdırlar.

o Emin değilim

9. Sizce bu yiyecekler protein yönünden yüksek veya düşük müdür?

	Yüksek	**Düşük**	**Bilmiyorum**
9.1 30 gr kaşar Peynir			
9.2 1 Bardak Fırında Pişmiş Kuru Fasulye			
9.3 1/2 Bardak Pişmiş kinoa			

10. Aşağıdaki yiyeceklerin vücut tarafından ihtiyaç duyulan tüm elzem amino asitleri içerdiğini düşünüyor musunuz?

	Evet	**Hayır**	**Emin Değilim**
10.1 Sığır bifteği			
10.2 Yumurta			
10.3 Mercimek			
10.4 İnek sütü			

11. Yağsız sütteki protein miktarı, tam yağlı sütle kıyaslandığında:

o Önemli ölçüde daha az

o Aynı sayılır

o Önemli ölçüde daha çok

o Emin değilim

12. Aşağıda farklı mikro besin ögelerinin rolü ile ilgili ifadeler bulunmaktadır. Lütfen katılıyorum, katılmıyorum veya emin değilim seçeneklerinden birini seçiniz.

	Katılıyorum	**Katılmıyorum**	**Emin Değilim**
12.1. Kalsiyum, kemik kristallerinin en büyük yapısal bileşenidir			
12.2. C vitamini vücutta bir antioksidan görevi görür.			
12.3.Tiamin (Vitamin B1), oksijenin kaslara etkili bir şekilde ulaştırılması için gereklidir			
12.4. Demir'in temel rolü, yiyeceğin kullanılabilir enerjiye dönüştürülmesidir			

13. Aşağıda farklı mikro besin ögelerinin besin kaynakları ile ilgili ifadeler bulunmaktadır. Lütfen katılıyorum, katılmıyorum veya emin değilimi seçiniz.

	Katılıyorum	**Katılmıyorum**	**Emin Değilim**

13.1. Et, Tavuk ve Balık en iyi çinko kaynaklarıdır			
13.2.Tamtahıllı gıdalar en iyi C vitamini kaynaklarıdır.			
13.3. Meyve ve Sebzeler en iyi kalsiyum kaynaklarıdır			
13.4. Süt, Yoğurt ve Peynir en iyi magnezyum kaynaklarıdır.			

14. Aşağıda sporcuların vitamin ve mineral gereksinimleri hakkında ifadeler bulunmaktadır. Lütfen katılıyorum, katılmıyorum veya emin değilimi seçiniz.

	Katılıyorum	**Katılmıyorum**	**Emin Değilim**
14.1. Sporcuların ter kaybından dolayı magnezyum ihtiyacı artar.			
14.2. Menstrüasyon dönemindeki kadınların erkeklerden daha fazla demir ihtiyaçları vardır.			
14.3. 15 ila 24 yaş arasındaki sporcular için ideal kalsiyum alımı 500 mg'dır.			
14.4. Fiziksel olarak formda olan ve beslenme açısından yeterli diyete sahip olan bir kişi, daha fazla vitamin ve mineral tüketerek performansını artırabilir			

15. Sporcuların aktivite sırasında neden su içmeleri gerekir?

o Plazma (kan) hacmini korumak
o Ağız kuruluğunu önlemek
o Ter hacmini korumak
o Yukarıdakilerin hepsi
o Emin değilim

16. Fiziksel aktivite sırasındaki sıvı alımına ilişkin olarak, mevcut öneriler nedir/nelerdir?

o Her 15-20 dakikada bir 50 - 100 ml sıvı almak
o Egzersiz sırasında sıvı almak yerine buz küplerini emmek
o Egzersiz yaparken su yerine spor içecekleri (örn. Powerade) kullanmak
o Benzer bir iklimde yapılan antrenman sırasında vücut ağırlığındaki değişikliklere göre yapılan bir plana göre sıvı almak
o Emin değilim

17. Hidrasyon amaçlı (egzersiz sırasında) tüketilen sıvı ne kadar karbonhidrat içermelidir?

o Hiç
o En az% 1 - 2 karbonhidrat
o En az% 4 - 8 karbonhidrat
o Emin değilim

18. Hidrasyon amaçlı (egzersiz sırasında) tüketilen sıvı ne kadar sodyum (tuz) içermelidir?

o En az 11 - 25 mmol / L (~ 250 - 575 mg / L)
o En az 4 - 8 mmol / L (~ 90 - 185 mg / L)

o Hiç
o Emin değilim

19. Aşağıda egzersiz sırasında karbonhidrat tüketimi ile ilgili ifadeler bulunmaktadır. Lütfen katılıyorum, katılmıyorum veya emin değilim seçeneklerinden birini seçiniz.

	Katılıyorum	**Katılmıyorum**	**Emin Değilim**
19.1. Egzersiz sırasında karbonhidrat tüketmek, güç ve kas kazanımını düşürebilir			
19.2. 60 - 90 dakika süren etkinliklerde, saatte 30-60 gr karbonhidrat tüketilmelidir			
19.3. Egzersiz sırasında karbonhidrat tüketmek kan glikoz seviyelerinin korunmasında yardımcı olacaktır.			

20. Mide rahatsızlığı bazen egzersiz sırasında yemek yiyen sporcular tarafından bildirilmektedir. Aşağıdakilerden hangisi rahatsızlığı önlemek için iyi bir strateji DEĞİLDİR:

o Su veya spor içecekleri yerine enerji jelleri kullanmak
o Düzenli aralıklarla küçük porsiyonlar tüketmek
o Spor içecekleri / yiyeceklerinde farklı karbonhidrat türleri (örn.,Fruktoz ve sükroz) karışımının seçilmesi
o Emin değilim

21. Bir yarışma sırasında, sporcular .....içeriği yüksek yiyecekleri tüketmeyi hedeflemelidir.

o Sıvı, lif ve yağ
o Sıvı ve protein
o Sıvı ve karbonhidrat
o Emin değilim

22. Yaklaşık 90 dakika süren yüksek yoğunluklu egzersiz sırasında tüketilen atıştırmalıklara yönelik önerileri aşağıdakilerden hangisi en iyi karşılar?

o Bir protein karışımı
o Olgun bir muz
o 2 Haşlanmış yumurta
o Bir avuç fındık
o Emin değilim

23. Bir müsabakadan sonra, sporcular hangi makro besin ögesi/ögeleri yüksek besinleri tüketmeyi hedeflemelidir?

o Protein, karbonhidrat ve yağ
o Sadece protein
o Sadece karbonhidrat
o Karbonhidrat ve protein
o Emin değilim

24. Aşağıda sporcuların belirli mikro besin ögesi takviyeleriyle ilgili ihtiyaçları hakkında ifadeler bulunmaktadır. Lütfen katılıyorum, katılmıyorum veya emin değilimi seçiniz.

	Katılıyorum	Katılmıyorum	Emin Değilim
24.1. C vitaminisporcular tarafından rutin bir şekilde takviye olarak alınmalıdır.			
24.2. B vitaminleri yorgun hissedildiği zaman alınmalıdır			
24.3. Tuz tabletleri egzersiz sırasında kramp giren sporcular tarafından kullanılmalıdır			
24.4. Sporcu aşırı yorgun hissettiğinde ve solgun olduğunda demir tabletleri alınmalıdır.			

25. Tüm takviyelerin saflığı ve güvenliği satış öncesi test edilir.

o Katılıyorum
o Katılmıyorum
o Emin değilim

26. Takviye etiketleri yanlış veya yanıltıcı bilgi içerebilir.

o Katılıyorum
o Katılmıyorum
o Emin değilim

27. Aşağıda performans artırıcı takviyelerin rapor edilen faydaları hakkında ifadeler bulunmaktadır. Lütfen katılıyorum, katılmıyorum veya emin değilim seçeneklerinden birini seçiniz.

	Katılıyorum	Katılmıyorum	Emin Değilim
27.1. Kreatin, merkezi sinir sistemi üzerine etki ederek egzersiz sonrası yorgunluğu azaltır.			
27.2. Kafein oksijen dağıtım hızında kasların verimliliğini artırır			
27.3. Pancar Suyu (nitrat) kas yıkımını ve kas ağrısını azaltır.			
27.4. Beta-Alaninyüksek yoğunluklu aktivite sırasında, üretilen asitin yan ürünlerini tamponlayabilen (“emdirebilen”) bir protein olan karnosini üretir.			

28. Spor performansının iyileştirilmesi ile ilgili olarak, aşağıdaki takviyelerden hangisinin güçlü bir bilimsel kanıtla desteklenmediğini düşünüyorsunuz?

o Kafein
o Ferulik asit
o Bikarbonat

o Lösin
o Emin değilim

29. Aşağıdaki takviyelerden hangisinin Dünya Dopingle Mücadele Ajansı (DÜNYA ANTI-DOPING AGENCY - WADA) tarafından yasaklandığını düşünüyorsunuz?

( )Kafein ( )Bikarbonat ( )Karnitin ( )Gliserin ( )Emin değilim

30. Standart bir içki genellikle kaç gram Etanol (saf alkol) içerir?

o 1 - 2 g
o 8 - 14 g
o 30 - 50 g
o Emin değilim

31. Aşağıdakilerden hangisi "Standart içki "ye örnek teşkil eder?

o 30 - 45 ml saf alkol
o Bir çeyrek şişe (175 ml) kırmızı şarap
o Tam bira bardağı (425 ml)bira
o Emin değilim

32. Diyetin bir parçası olarak tüketildiğinde, saf alkol (etanol) kalori içerir ve bu nedenle kilo alımına yol açabilir.

o Katılıyorum
o Katılmıyorum
o Emin değilim

33. Alkol kullanmayı tercih eden bireyler için, yaşam boyu alkolle ilgili zarar riskini azaltmak için, günde standart içeceklerden.....'dan daha fazla tüketilmemelidir.

o İki
o Üç
o Dört
o Emin değilim

34. Aşağıda ifadeler alkol tüketimi ile ilgili ifadeler bulunmaktadır. Lütfen katılıyorum, katılmıyorum veya emin değilim seçeneklerinden birini seçiniz.

	Katılıyorum	**Katılmıyorum**	**Emin Değilim**
34.1. Kişi hafta içi hiç içki içmezse, hafta sonu beş veya daha fazla içki içebilir.			
34.2. Çok miktarda alınan alkol sakatlık sonrası iyileşmeyi yavaşlatabilir.			
34.3. Alkolün egzersiz sonrası toparlanma sırasında idrarla kayıpları artırdığı görülmüştür.			

35. "Aşırı içki içme" (aynı zamanda ağır epizodik içme olarak da adlandırılır) genellikle şöyle tanımlanır:

o Tek seferde iki veya daha fazla standart alkollü içecek içmek
o Tek seferde dört ila beş ya da daha fazla standart alkollü içecek içmek
o Tek seferde yedi ila sekiz ya da daha fazla standart alkollü içecek içmek
o Emin değilim