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INSTITUTE OF HEALTH SCIENCES

DEPARTMENT OF NUTRITION AND DIETETICS

DETERMINATION OF THE NUTRITION AND NUTRITIONAL ERGOGENIC AIDS USAGE OF SOCCER PLAYERS IN DIFFERENT LEAGUES

MASTER'S THESIS

YAĞMUR SÖZERİ

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SUPERVISOR

Prof. Dr. Baki Serdar ÖZTEZCAN

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	Ünvanı, Adı-Soyadı (Kurumu)	İmza
Jüri Başkanı:	Dr. Öğr. Üyesi İrem KAYA CEBİOĞLU – Yeditepe Üniversitesi	
Tez danışmanı:	Prof. Dr. Baki Serdar ÖZTEZCAN – Yeditepe Üniversitesi	
Üye:	Dr. Öğr. Üyesi Jale ÇATAK – İstanbul Sabahattin Zaim Üniversitesi	

ONAY

Bu tez Yeditepe Üniversitesi Lisansüstü Eğitim-Öğretim ve Sınav Yönetmeliğinin ilgili maddeleri uyarınca yukarıdaki jüri tarafından uygun görülmüş ve Enstitü Yönetim Kurulu'nun 31/07/2019 tarih ve 2019/13-32 sayılı kararı ile onaylanmıştır.

Prof. Dr. Bayram YILMAZ
Sağlık Bilimleri Enstitüsü Müdürü

DECLARATION

I here by declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree except where due acknowledgment has been made in the text.

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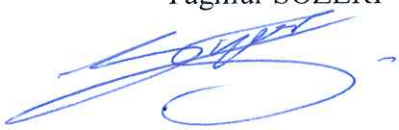

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LIST OF SYMBOLS AND ABBREVIATIONS

ACSM	American College of Sports Medicine
ADP	Adenosine-diphosphate
ATP	Adenosine-triphosphate
Acetyl CoA	Acetyl Coenzyme A
BCAA/BCAA	Branched Chain Amino Acids
CoQ_{10}	Coenzyme Q10
CK	Creatine Kinase
CLA	Conjugated Linoleic Acid
CP	Creatine Phosphate
DRI	Diet Reference Intake
EFSA	European Food Safety
FAD	Flavin Adenine Dinucleotide
FIFA	Federation International de Football Assocation
GI	Glycemic Index
HMB	Hydroxy Methyl Butyrate
IOC	International Olympic Committee
ISSN	International Sports Nutrition Association
Kcal	Kilocalories
LDH	Lactate Dehydrogenase
MPS	Muscle Protein Synthesis
NAD	Nicotinic Acid Dehydrogenase
NCAA	National Collegiate Athletics Association
NH2	Amine Group
RDA	Recommended Daily Allowance
TFF	Türkiye Futbol Federasyonu
TE	Total Energy
TÜBER	Türkiye Beslenme Rehberi
WADA	Worl Anti-Doping Agency
VLDL	Very Low Density Lipoprotein
VO_2 max	Oxygen Usage Capacity

ABSTRACT

Sözeri Y. (2019). Determination of the Nutrition and Nutritional Ergogenic Aids Usage of Soccer Players in Different Leagues. Yeditepe University Institute of Health Sciences, Department of Nutrition and Dietitetics, Master Thesis, Istanbul.

The aim of this study is to determine the nutritional status of soccer players (Super League, TFF 1. League, 2. League, 3. League and Ameteur League) playing in different leagues and to evaluate the use of nutritional ergogenic aid products that have been used in recent years and also to search the frequency, amount, purpose of the use and awareness of the players if they use these products. The research group has been composed of a total of 380 male Turkish Federation League soccer players who play soccer in Turkish Super League, 1st League, 2nd League, 3rd League and Regional Amateur League in 2018-2019 Soccer Season. A questionnaire was used to question the anthropometric and general characteristics of the players and the consumption of nutrition and nutritional ergogenic aids for 24 hours. SPSS (version 25.0) and BEBIS program were used for statistical calculations. Frequency and percentage values of the obtained data were calculated and chi-square test was applied to find the differences between the teams in different categories. When P value was less than 0.05, the difference between the groups was considered significant. Then, in the questions with significance between leagues, a comparison was made and p value less than 0.005 was considered significant.

Significant differences were observed in the nutritional status of soccer players according to different leagues. In soccer players, generally, as the league level decrease, a decrease in nutritional, daily consumed energy and nutrient intake status has been observed. It has been observed that soccer players do not know that they are undernourished in terms of many micronutrients and there is not much difference among the Leagues in terms of ergogenic food consumption and also the soccer players are over-trusted and overuse micronutrients. Generally, many studies about soccer players have been made with professional and amateurs. In our study, comparisons were made among the leagues.

In our study, it is seen that soccer players consult trainers more than dietitians or health experts and their choices are not suitable for their personal needs. In conclusion, it is important to determine the nutritional needs of soccer players in terms of nutrition depending on the leagues and to prevent unconscious use of nutritional ergogenic support products. For this reason, it is clear that scientific-based dietician orientation will contribute to the development of soccer players and thus Turkish football.

Keywords: Ergogenic aids, sports nutrition, different league, Determination of the Nutrition, high capacity performance, maximal oxygen capacity, sports metabolism, nutrients

ABSTRACT (Turkish)

Sözeri Y. (2019). Farklı Liglerde Oynayan Futbolcuların Beslenme ve Besinsel Ergojenik Destek Kullanım Durumunun Saptanması. Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü, Beslenme ve Diyetetik Bölümü, Master Tezi, İstanbul

Bu çalışmanın amacı farklı liglerde oynayan futbolcuların (Süper Lig, TFF 1.Lig, 2.Lig, 3.Lig, Bölgesel Amatör Lig) beslenme durumunu saptamak ve son yıllarda kullanımı giderek artan besinsel ergojenik destek ürünlerinin kullanımını; eğer kullanıyorlarsa sıklığını, miktarını, amaçlarını ve bu konudaki bilinç düzeylerini liglere göre araştırmaktır. Araştırmaya 2018-2019 futbol sezonunda Türkiye Süper Lig, Tff 1.lig, 2.lig, 3.lig ve Bölgesel Amatör Liglerinde yer alan takımlardan aktif olarak futbol oynayan 380 futbolcu katılmıştır. Çalışmamızda futbolculara antropometrik ve genel özelliklerini, 24 saatlik besin ve besinsel ergojenik destek tüketimini sorgulayan anket uygulanmıştır. İstatiksel hesaplamalarda SPSS (version 14.0) ve BEBIS programı kullanılmıştır. Elde edilen verilerin frekans ve yüzde değerleri hesaplanmış, farklı kategorilerde yer alan takımlar arasındaki farkları bulmak için ki-kare testi uygulanmıştır. P değerinin 0,05'ten küçük olduğu durumlarda gruplar arasında anlamlı fark olduğu kabul edilmiştir. Ligler arasında anlamlılık bulunan sorularda ikili karşılaştırılma yapılmıştır ve p değerinin 0,005'ten küçük olan anlamlı kabul edilmiştir.

Futbolcuların farklı liglere göre beslenme durumlarında oldukça anlamlı farklar görülmüştür. Genellikle lig seviyesi düştükçe genel beslenme yaklaşımları, günlük tükettikleri enerji ve besin ögeleri alım düzeylerinde bir düşme görülmüştür. Futbolcular birçok mikro besin ögesinden eksik beslendiklerini bilmedikleri gibi, ergojenik besinleri fazla tüketmekte ve bu ürünlere aşırı güvenmektedirler. Futbolcularla ilgili bilimsel çalışmalar genellikle profesyonel ve amatör guruplar arasındaki farkların araştırılması amacıyla yapılmıştır. Bizim çalışmamızda ise ligler arasında da karşılaştırmalar yapılmıştır.

Çalışmamızda futbolcuların bu konuyla ilgili diyetisyen veya sağlık profesyonellerinden daha çok antrenörlere danıştıkları ve büyük çoğunlukla seçimlerin kişisel ihtiyaçlarına uygun olmadığı saptanmıştır. Sonuç olarak futbolcuların liglere göre beslenme konusundaki eğitim ihtiyaçlarının belirlenmesi ve besinsel ergojenik destek ürünlerinin bilinçsiz kullanımının önlenmesi önemlidir. Bu sebeple bilimsel temelli diyetisyen yönlendirmelerinin futbolcuların, dolayısıyla Türk futbolunun gelişimine katkı sağlayacağı açıktır.

Keywords: Ergojenik ürünler, sporcu beslenmesi, farklı ligler, besin tüketim durumu, yüksek performans kapasitesi, maksimal oksijen kapasitesi sporcu metabolizması, besin ögeleri

1. INTRODUCTION and PURPOSE

The main factors affecting the performance of athletes are genetic structure, proper training and nutrition. Sports nutrition can be defined as a balanced intake of the main nutrients, which are carbohydrates, fats, proteins, vitamins, minerals and water in order to meet the energy needs of the basic activities of athletes, to enable their muscle development as well as to help athletes comply with the trainings and maximize their training effects (1).

The aim of sports nutrition is that the nutrients consumed are proper for the sex, age and daily physical activity of the athlete. However, according to the type of sports performed by the athlete, arrangements for training and competition periods fall within the scope of sports nutrition. In the regulation of sports nutrition; athletes' height, body weight, body fat percentage, nutrition knowledge level, dietary habits, health status, social and economic conditions should be considered. (2).

Soccer is a high-intensity, intermittent activity that requires both strength and endurance in a 90-minute period. It is important for soccer players of all skill levels to know the type of food they eat and how their nutrition time can affect themselves either during training or during the competition (3).

It has been observed that energy usage rates of soccer players reaching up to 65% oxygen usage capacity (VO_2) throughout the world are distributed as 10% plasma glucose, 20% muscle triglycerides, 35% plasma free fatty acids and 50% muscle glycogen. (4). Likewise, in a study conducted in Turkey, for both professional and amateur soccer players maximum oxygen consumption was found to be 57.89% and 53.35% respectively (5). As can be seen, for high capacity performance it is important that all nutrition groups are taken in order to meet the above ratios (6).

The level of glycogen storage is very important in activities requiring glucose use under anaerobic conditions. 80% of body glycogen stores are found in muscle tissue. It is known that glycogen stores are one of the basic tools of training (7). Reduction of carbohydrate intake by diet or reduced muscle glycogen stores due to intensive exercise may affect different physiological and biochemical changes by affecting the metabolism of exercise, especially in soccer players. Some of them are increase of fatty acid release

from adipose tissue, increase in plasma free fatty acid level and also increase in plasma interleukin-6, epinephrine and norepinephrine release (8). In the last part of the exercises performed with low muscle glycogen stores, there is an increase in fat oxidation and related enzymes especially in low-intensity exercises (9). It is observed that muscle proteins stimulate gene expression during training and therefore have great importance in the formation of training response and adaptation process (7).

The Renaissance rediscovered classical art along with the Hellenic beauty pattern, making the choice of the academy, concern for appearance, body exercise, and specific dietary pursuits since then, habits inherited from ancient Greece and desired by many people (2). With the beauty standard imposed, the use of nutritional supplements with the intention of improving aesthetics and physical performance has contributed to the fact that athletes and physically active people are their biggest consumers, who for the desire to achieve fast results have made use of these supplements very attractive, and are now readily available worldwide.

Supplementation of specific nutrients with the intention of improving athletes physical performance gave rise to ergogenic supplementation (3). The ergogenic word is derived from the Greek origin ergo (work) and gen (production of), usually having the meaning of improvement of the potential for work production (10). The athletic support by athletes is elements, treatments and strategies that improve performance and improve the benefit achieved by the training (11).

In addition to the positive effects of nutritional supplements used for ergogenic purposes, few athletes considere that they may have negative effects. In addition to the positive effects of the nutritional supplements used for ergogenic purposes, few athletes believe that they may have negative effects (12).

Despite many publications supporting adequate and balanced nutrition for optimal performance, the use of nutritional support products is increasing rapidly among athletes. It has been determined that the use of nutritional support products, especially in developed countries, increases each year exponentially, and 71% of athletes (more than 170 million people) get ergogenic support in order to fill food gaps and in terms of general health, health assistance and energy intake (13). A significant portion of these products are less well known and have insufficient research and data (14). Although the athletes are not familiar with the contents and properties of the products they consume, they continue to use the products in question. No matter how much vitamin, mineral and protein

supplement is provided to an athlete who is implementing an unhealthy and unbalanced diet, it is not enough for the body and does not increase the performance (15).

This study aims to investigate the differences of soccer players who play in different leagues (Super League, TFF 1st League, 2nd League, 3rd League, Regional Amateur League) by examining their nutritional status, their use of more nutritional ergogenic support products in recent years, their frequency and aimof their use and their awareness levels. In the light of the information to be obtained, it can be provided to determine the training needs of soccer players on the basis of leagues and to prevent the negativity caused by unconscious use of nutrition support products. In this respect, this research is considered to have great importance.

2. LITERATURE REVIEW

2.1. Sport

Sport can be described as a general title of the rule based action which is done with a group or individually on the purpose of health, fun or show and reqiures physical or mental activity (16).

2.2. Soccer

Soccer is a sport game that is played in a particular area in accordance with the rules, using any part of the body except arms and hands. In this game, the match result is determined according to the goal number. The purpose of the players is to score the ball into the opposing team's goal, obeying the rules. Besides, in case the opposing team wins the ball, they defense and try to prevent the opposing team's goal (17).

2.2.1. Strength in Soccer

Muscle strength is considered to be the most important factor influencing athletic performance. Lower extremity strength is an important determinant of soccer and remains under great stress during high intensity activities. It is stated that there is a need for lower extremity strength as much as upper extremity strength (arm, shoulder, body, flexor and extensor muscles) during the competition (18). For goalkeepers, the muscle groups of almost the entire body are very important for performing their position-specific movements (19). In a study conducted in Turkish Football League, it is observed that as the league level increases, the strength output of soccer players also increase (20). It is also stated that the defenders and strikers have higher strength level than the players in other positions (21). High muscle strength is also important to reduce the risk of injury (19).

2.2.2. Soccer and Energy

2.2.2.1. Energy

Energy is defined as the ability to do work. The human body needs energy to maintain its complex functions. The energy requirement of a person increases with exercise. Adenosine-triphosphate is a multifunctional nucleotide existing in the cell and abbreviated as ATP. Its most critical function is to carry the chemical energy required for intracellular biochemical reactions. It is produced during photosynthesis and cellular respiration. ATP is the source of phosphate required for protein kinase reaction in

intracellular signal transduction. It consists of 3 phosphates. Energy is stored between chemical bonds that bind these phosphate groups. By spliting off 1 phosphate from ATP, energy is released and ADP is formed (Figure 2.1). This cycle continues in the body and the resynthesis of ATP continues in this way. The breakdown of ATP to ADP releases energy. For example breakdown of 1 mole ATP releases 7-12 kcal energy. The total amount of ATP is 80-100 g (4).

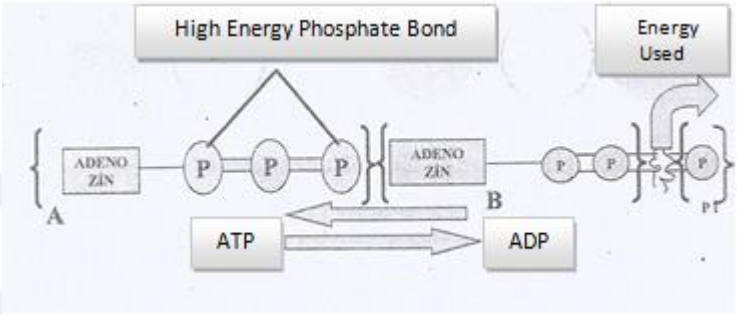


Figure 2.1.ATP Synthesis

2.2.2.2. Energy Systems

There are three basic energy systems for energy production in the body, including ATP-CP (Creatinine Phosphate System), Anaerobic Glycolysis (lactic acid) System, Aerobic Glycolysis and Lipolysis System. Of these, ATP-CP and anaerobic glycolysis systems can re-synthesize ATP without oxygen (anaerobic). The ATP in the aerobic system can be re-synthesized in the presence of oxygen.

The ATP and CP are named as phosphogens which are stored in the muscles in some amount. For short (10 seconds) and high-intensity acute exercises, this energy source is used. ATP and CP muscle stores is quite limited. Anaerobic glycolysis is used for explosive energy that will last less than 8 seconds. In this way, glucose is broken down without the need for oxygen and then energy released. The aerobic energy system is the most efficient system which is used primarily at rest and during low-intensity activities (22).

Although all three systems have the same important objective, in terms of their strengths and capacities, they vary significantly. These characteristics affect the intensity (speed) and duration (efficiency) of the exercise (23). The three systems in energy production work the same way to re-synthesize ATP. The energy released during the reactions in the cell is used to recombine ADP and P to form ATP (Figure 2.1)(24).

2.2.2.3. Energy Metabolism

Sources of carbohydrates for the muscle include blood glucose, muscle glycogen and liver glycogen.

Glucose and glycogen are converted to glucose-6-phosphate before they can be used to generate energy. One fate of glucose-6-phosphate is converted to lactic acid, which results in the formation of three molecules of ATP per glycogen molecule or two molecules of ATP per glucose molecule (anaerobic glycolysis). Following lactic acid production, glucose ends up. This pathway is controlled by the enzyme called nicotinic acid dehydrogenase (NAD). This system is used if muscle activity will last longer than 90-120 seconds. The ATP generated by anaerobic glycolysis is not large enough to sustain continued muscle activity for long durations. With submaximal exercise, oxygen uptake increases, and within several minutes, a steady state is reached. This steady state indicates that the aerobic processes are supplying the majority of energy required by the contracting muscles. Aerobic generation of ATP from the glucose molecule is many times more efficient than the anaerobic reaction of glycolysis. During the aerobic reaction of glycolysis, glycogen is converted to pyruvic acid, which is then converted to acetyl-CoA and utilized for ATP production in the Krebs cycle within the mitochondria. Acetyl-CoA enters the krebs cycle in the mitochondria, and 36-38 ATP is produced per glucose molecule. Re-synthesized ATP is used by muscle during contraction. It can also be used to generate energy from fats and proteins by the aerobic process (Figure 2.1.) (25,4).

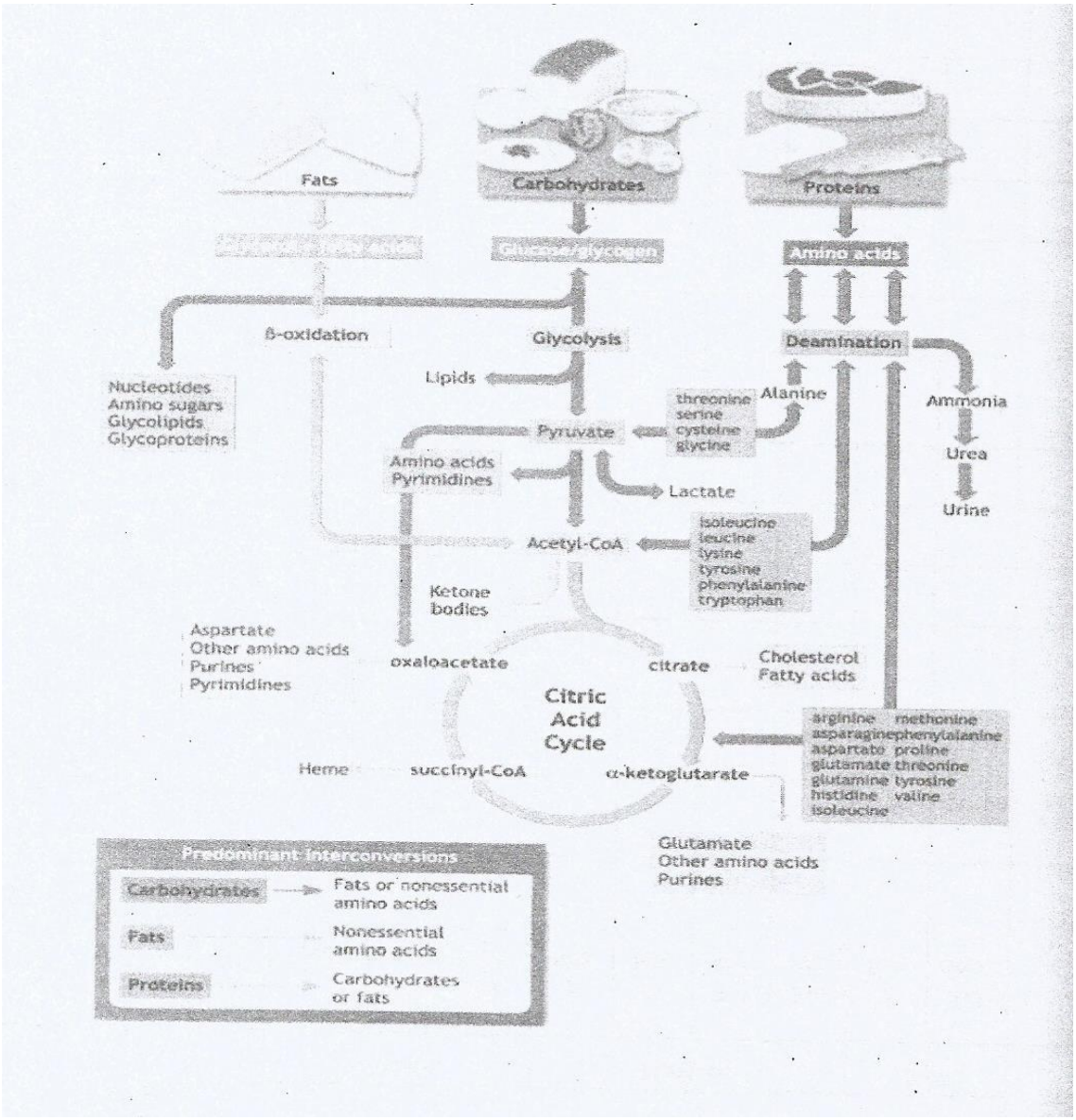


Figure 2.2. Energy Production Process from Nutrients

2.2.2.4. Energy Use in Soccer

Anaerobic systems are used in all high-intensity and short-term activities. The intensity of the exercise is so high that the aerobic energy system does not have the ability to produce energy so quickly (26). While 80-90% of the activities in soccer are low and moderate intensity activities, 10-20% of them include high-intensity. Therefore, all three energy systems are used. But the main system is the anaerobic system as soccer generally requires explosive power and high intensity muscle activities (sprint, jump, tackle, head shot, kick, acceleration, deceleration) with a duration not more than 4 seconds (Figure 2.3) (27).

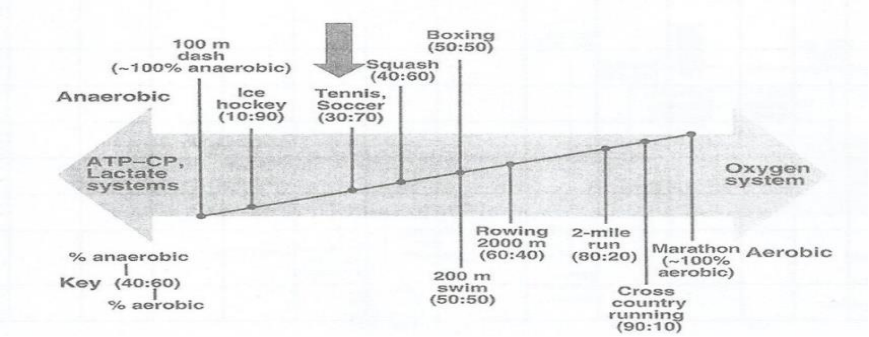


Figure 2.3. Energy Systems in Sport

The total distance covered during the competition is very important. Nevertheless the level of high intensity activity performed by the soccer player while covering this distance is also quite important. (28). The energy of the human body is obtained through nutrition (24).

2.3. Soccer and Nutrition

2.3.1. Nutrition

Nutrition is the assimilation of the sufficient amounts of food materials by human beings to enable them to grow, to develop and to live a long and productive life (29).

2.3.2. Importance of Nutrition in Soccer

Nutrition is a very important factor affecting the performance of soccer players. The success of the player depends on the speed, strength, agility, flexibility, balance, muscle and cardiorespiratory endurance which are closely related to the principles of nutrition and players nutrition.

It is possible for the athletes to increase their performance depending on their age, gender and adequate and balanced nutrition according to their sports branch along with appropriate training. Therefore, athletes and coaches should have sufficient knowledge about these issues (30).

2.3.3. Use of Basic Nutrients in Soccer

In order to maintain body weight during high periods of physical activity, to replenish glycogen stores, to provide adequate protein to tissue construction and repair,

energy and macro nutrients requirements should be met, especially carbohydrate and protein (31).

2.3.3.1. Soccer and Macro-Nutrient Relationship

2.3.3.1.1. Soccer and Carbohydrates

2.3.3.1.1.1. Carbohydrates

They are one of the main nutrients that provide energy to the body. It is recommended that 45 to 60 % of the daily energy be taken from carbohydrates. Carbohydrates are organic compounds composed of carbon, oxygen and hydrogen. While carbohydrates are found in very small amounts in foods of animal origin such as meat, eggs and milk, they are the most common nutrient element in all vegetative foods. Carbohydrates are classified as monosaccharides, disaccharides, oligosaccharides and polysaccharides according to their structure. In terms of their their function, they are classified according to their glycemic index (GI) (32).

Monosaccharides are often called the basic unit of the simple sugar molecule and all carbohydrates. They are sweet. This property comes from the hydroxyl groups (OH) in their composition. They are classified according to the number of carbon atoms in their structure. These carbohydrate molecules have between 3 and 7 carbon atoms and named according to these numbers (4). Monosaccharides most commonly found in foods are glucose, fructose and galactose (33).

Disaccharides form when two monosaccharides are combined by losing one molecule of water. This bond is called glycoside bond. The most common types of disaccharides are sucrose (table sugar), lactose and maltose, which are formed by the combination of hexoses. Disaccharides are naturally present in fruits, milk and dairy products and present as additional sugar in a wide range of carbonated beverages, candies, jellies and desserts.

Polysacacrides are polymers formed by monosaccharides combined with glycoside bond. It is usually divided into two groups as starch or non-starch. The nutrients in this group slowly increase blood glucose and provide long-term energy. They balance the level of blood glucose and delay the formation of a sense of hunger. Increases bowel movement and helps the formation of feces (33).

The glycemic index (GI) is calculated by dividing the area under the blood glucose density-time curve (AUC) following ingestion of a test food such as glucose or white bread corresponding to 50 g carbohydrate after an overnight fasting. GI is an indicator of carbohydrate digestion rate and may be affected by the training situation. As well as the type of carbohydrate consumed by the athlete, the glycemic index is also important. (32).

Carbohydrates are the first nutrients to be used as energy and all tissues use carbohydrates for energy. Brain tissue uses only glucose to provide energy except hunger. Carbohydrates help retain water and electrolytes in the body, helping to restore sodium. Carbohydrates prevent the use of proteins as energy. Foods rich in Carbohydrates give energy and also contain vitamins, minerals, pulp and phytochemical compounds. Therefore, carbohydrates in fruits, vegetables and cereals are recommended as the best and most preferred carbohydrate sources.

2.3.3.1.1.2. Carbohydrate Metabolism in Soccer Players

The carbohydrates taken with food are stored as glycogen in liver and muscles. However, the body has limited capacity to store carbohydrates (34). Liver is able to store glycogen upto 10% (75-100 g) of its own weight and muscles are able to store glycogen upto 1-2% (300-500 g) of their own weight. The individuals who exercise regularly can increase the carbohydrate storage depot by 1.5-2 times with adequate and balanced diet (35).

There are three basic pathways to metabolize carbohydrates. The first two pathways are anaerobic (glycolysis and glycogenolysis) and do not require oxygen to produce energy. The third metabolic pathway is called oxidative metabolism, which needs oxygen to produce energy (4,7).

Glycolysis is the metabolic pathway which results in the breakdown of blood sugar to produce ATP. It is a metabolic procedure which involves 10 enzymatic stages occurring in the cytoplasm of cells and is represented by two different processes. These two processes are referred to as anaerobic glycolysis and aerobic glycolysis. Anaerobic glycolysis is not practical because it forms outside the mitochondria. While anaerobic glycolysis results in lactic acid, aerobic glycolysis results in pyruvate formation. Anerobic glycolysis results in 2 ATPs (4,7).

Oxidative metabolism takes place in the mitochondria and requires oxygen to produce energy. If there is sufficient amount of oxygen, the pyruvate which is the end product of the anaerobic glycolysis will be transported to the mitochondria where it will

enter the Krebs cycle. The cycles known as the Krebs cycle or citric acid cycle, are a series of (FADH2) reactions that result in the production of one molecules of reduced flavin adenine dinucleotide (FAD), three nicogenamide adenine dinucleotide subunits (NADH + H) and Two Guanosine triphosphate molecules (GTP), per glucose molecule. When NADH + H and FADH2 molecules are produced, the hydrogen atom is transported to the electron transport chain where ATP is re-produced by adenosine diphosphate or oxidative phosphorylation. These systems are used for soccer players (4,7).

2.3.3.1.1.3. The Role of Carbohydrates in Soccer Players

The main source of energy during exercise is carbohydrates. 1 g carbohydrate provides an average of 4 kcal of energy. During daily trainings energy is provided by glycogen stores in the muscles. With an intensive carbohydrate loading, the capacity of glycogen stores may increase by 1.5 to 2 times. In cases where soccer players can not adequately replenish their glycogen stores, symptoms such as fatigue or overtraining may occur. If glycogen stores are empty, fats and proteins are used in the body to provide energy, but they leave residual substances such as keton bodies that cause fatigue and nausea. In energy production, only 1/3 of the proteins are converted to energy and the rest is excreted from the body as nitrogen (36,29,37).

Carbohydrates are the main source of energy that allows the muscles to work properly during training and exercise. It provides high energy, especially for exercisers training long durations or heavy-duty workers (38).

In high-intensity / supramaximal exercises that last from a few seconds to 10 minutes, ATP production is largely obtained by anaerobic and oxidative metabolism of carbohydrates (39). Carbohydrates can be used as a fast energy source since they contribute to energy production without the need for oxygen. However, the cells must contain oxygen to provide energy from the fats during exercise. When sufficient oxygen cannot be delivered to the muscles, proteins and fats can not produce sufficient energy to support intensive exercises (40).

During exercise, the level of liver glycogen begins to decrease as the need for glucose increases. If the exercise is continued when the liver glycogen depleted, the muscles will continue to use the available blood glucose as an energy source. When blood glucose levels fall below normal level, it will cause hypoglycemia. Therefore, consumption of carbohydrate foods before a long exercise helps to maintain blood glucose levels and

increase performance (41). Trying to continue training or competition with low carbohydrate stores leads to increases in the risk of injury and damage. Thus, carbohydrate intake of athletes should be increased (42). Inadequate glycogen stores may cause fatigue, decrease performance and negative impacts on the immune system. If the body can not meet carbohydrates requirement during the exercise, it uses fat and protein as an energy source (43).

2.3.3.1.1.4. Carbohydrate Requirements and Consumption of Soccer Players

It should be kept in mind that the energy and carbohydrate requirements of each athlete may vary and may be different from each other, depending on the intensity of training, age, body weight and gender (44).

Factors such as the intensity and duration of exercise are among the factors that affect the carbohydrate requirements of athletes. Nevertheless, an athlete should consume about 5-10 g/kg of carbohydrates daily (36). For soccer players 70% carbohydrate intake is recommended (37). Normally, the amount of carbohydrate to be taken is determined according to the intensity of training. If the training is low intensive (<1 hour training/day) 3-5g/kg/day, if it is moderate intensive (1 hour/day) 5-7 g/kg/day and if it is high intensive (1-3 hours/day) 6-10g/kg/day carbohydrates should be taken (45). The carbohydrate requirement should be individualized according to the training and competition period of the athlete (46). It is known that very low carbohydrate intake significantly reduces isometric muscle strength and isokinetic strength production and reduces exercise performance (47).

2.3.3.1.1.5. Carbohydrate Loading in Soccer Players

One week before endurance training, while increasing the athletes' intake of carbohydrates, decreasing their training intensity and duration is defined as ”carbohydrate loading". Filling the muscle glycogen stores depends on nutrition and previous carbohydrate loading. When 100 g of the basic foods taken with daily diets are consumed, an average of 1.5 grams of glycogen supplementation is made in the muscles. When a high-carbohydrate menu is consumed, this amount increases to 2 g. With intensive training, it takes about 48 hours for the muscle glycogen stores to be emptied and return to the old level with daily nutrition. However, with an intensive carbohydrate loading of 65-70%, it is possible for glycogen stores to replenish within 24 hours. This value can be increased up to 2.5 grams when the loading is required to continue (48).

2.3.3.1.2. Soccer and Proteins

2.3.3.1.2.1. Proteins

Proteins, known as the building blocks of the body, are large molecular biological substances composed of amino acids (49). Amino acids are organic elements consisting of a carboxyl (COOH) and an amine (NH3) group attached to a radical (R) of different chemical structure. The source of NH2 in the structure of amino acids is the inorganic nitrogen which is mixed with air from soil. Peptides are formed by the reaction of two molecules releasing a molecule of water from carboxyl and alpha amino groups. This bond is called the "Peptide Bond" (50).

There are twenty different amino acids for use in the human body. Eight of them are considered to be essential amino acids because they cannot be produced in the body and the intake with diet should be in sufficient amounts. These are called lysine, threonine, leucine, isoleucine, methionine, phenylalanine, tryptophan and valine. Tyrosine and cysteine, which are the two of the non-essential amino acids, can become essential amino acids under certain conditions. Under normal conditions the body produces tyrosine from phenylalanine and cysteine from methionine. When the intake of phenylalanine and methionine is low, the body will need tyrosine and cysteine and therefore it becomes essential. For young people, arginine can be considered necessary in the case of severe illness and stress, in the lack of growth and development. The main task of amino acids is to form the building block of proteins needed by the body. However, in order to generate energy, liver and muscle metabolize them (Figure 2.2) (51).

Water is used in the breakdown of the peptide bond in proteins. Therefore, excessive protein intake causes dehydration. Furthermore, excessive protein intake may cause impairment of renal functions (49).

Protein is found in both animal and vegetable sources. Animal proteins such as egg, milk and dairy products, meat, fish and poultry, contain all of the essential amino acids (52). Therefore, animal proteins are also called good quality proteins. The conversion ratio of good quality proteins to body tissues is high. Good quality proteins also serve in the synthesis of non-essential amino acids. Animal proteins provide essential amino acids as well as non-essential amino acids, and about 95% can be digested (53). According to animal proteins, the essential amino acid content of plant based proteins is lower. An adequate amount of amino acids is taken by consuming various protein sources on daily

basis. Plant proteins are legumes, cereals, vegetables and oilseeds. Plant proteins contain pulp and low amounts of fat, do not contain cholesterol, and are generally less energetic than animal proteins. Plant proteins also include antioxidants and phytochemicals that are protective against heart diseases and some types of cancer (51). The protein quality of the diet is enhanced by consuming plant based protein sources along with the animal protein source (54).

The main function of the protein is the formation and preservation of the tissues and a necessary nutrient for growth and development. At the same time, besides muscle building and strength increase, it participates in the structure of enzymes and hormones and acts in the immune system. These functions of the protein occur only when the energy intake from carbohydrates and fats is sufficient (55). Proteins serve as energy sources when there is no carbohydrate or fat (56). Nitrogen balance reflects the equilibrium between protein intake and losses (57).

2.3.3.1.2.2. Protein Metabolism in Soccer Players

There is no free amino acids store in the body. However, cellular proteins form a particular pool of amino acids, meeting the requirements at the desired time. Thus, there is a continuous exchange of proteins with the amino acids in the pool and there is a dynamic balance between them. Arginine, combined with creatine phosphorus synthesized from glycine and methionine, forms high energy creatinine-phosphate. The separation of the amine group from the proteins by oxidative deamination occurs mostly in the liver. As a result of deamination, with the separation of amine groups, some amino acids are converted to pyruvic acid, some to oxalic acid, some to acetic acid and others to a-keto-glutaric acid and converted to CO_2, H_2O, energy, carbohydrate and fat by oxidizing in krebs cycle. When leucine and lysine which are amino acids are degraded to acetoacetic acid, they are known as ketogenic amino acids. Phenylalanine, trozine and tryptophan are both ketogenic and glycogenic. They are glycogenic as glucose is formed from other amino acids. In the muscle tissue, the pyruvate converts to alanine. Alanine is transported to the liver and undergoes deamination. The resulting ketoacid is converted to glucose. This cycle is important for energy formation in the inadequate intake of glucose (50).

2.3.3.1.2.3. The Role of Proteins in Soccer Players

Proteins are one of the main nutrients needed by athletes to increase muscle mass and to accelerate recovery. Unlike carbohydrates and fat, the body does not store protein. Protein production from carbohydrates or fats is not possible. So protein must be a part of

an every-day diet for the body. If there is not sufficient protein intake into the body, strengthening of the muscle tissue is unsustainable. Tissues with structural activity are subject to fragmentation (48, 58).

The protein is required to support the repair of damaged body tissues and to make new proteins in response to exercise. (41). Lactic acid produced during intense exercise and increases the acidity of body fluids and causes fatigue in the muscles. Proteins delay the onset of fatigue during exercise by removing lactic acid (59). Hemoglobin is a protein-derived carrier molecule that carries oxygen in the blood to tissues in the body. When hemoglobin levels are low, muscle cells are given less oxygen, thus reducing exercise capacity and endurance. Although proteins are not used as the main energy source, they can provide energy to the body during or after exercise. The body prefers carbohydrates and fats to provide energy at rest and during exercise. However, if carbohydrate stores are insufficient, energy can be supplied by converting proteins to glucose. It is cold glyconegesis (60).

While proteins taken with diets support muscle protein synthesis, they reduce protein degredation of muscles and repair muscle damage. Because leucine increases oxidation in individuals who exercise endurance, the protein requirement in these individuals may be slightly higher. It is also recommended that the protein in the diet be taken from high quality protein. The intake time should also be considered when determining the protein requirements. The appropriate timing in the post-exercise (recovery) period allows the recovery process to be faster and enhancing of adaptation (61).

The branched-chain amino acids (BCAA) which are the essential amino acids are metabolized directly in the muscle for energy. The branched-chain amino acids constitute approximately one third of the protein found in muscle tissue. BCAAs provide a source of energy during exercise and play a role in the regulation of muscle protein synthesis. BCAAs are abundant in all nutrients. Dairy products, meat, wheat protein, soybean and whey isolates are rich sources of BCAA (62).

2.3.3.1.2.4. Protein Requirement and Consumption of Soccer Players

In order to meet protein requirements, the individual's current body weight, total energy intake, weight loss or weight gain, exercise intensity and duration, protein quality

and age of the individual should be taken into consideration (63). The increase in need arises from increasing potein production-degredation process related to exercise (64).

Dietary protein requirements increase with strength and endurance exercise. Energy intake, exercise intensity and duration, ambient temperature, gender and age also affect protein requirements (61).

The amount of protein requirement in low intensity exercise is 0.8-1.0 g/kg per day, in moderate intensity exercise is 1-1.5 g/kg per day and in high intensity exercise is 1.5-2g/kg per day. When the athlete targets an increase in muscle mass, in other words in very heavy exercise situations this requirement can be increased up to 2.2 g per kg (65).

Additional protein intake may be required due to reasons such as negative energy balance and inadequate carbohydrate intake in order to meet energy needs in heavy exercise, to provide recovery after exercise and to increase muscle size and strength. However, the greatest increase in protein requirement occurs at the early stages of a new exercise program or when there is a change in the the type and intensity of the exercise (41).

Protein requirement may increase due to bumps, collision, injury and peel arising from tackle among the players during the competition. It is stated that the intake of approximately 6 g of essential amino acid after exercise increases muscle protein synthesis (31).

Protein requirement in soccer players according to the American Society of Sports Medicine (ACSM, 2016), the International Sports Nutrition Committee (ISSN 2010) and the National Force and Ventilation Association (NSCA 2007) is respectively 1.2-1.7 g/kg body weight, 1.4-2.0 g/kg body weight and 1.5-2.0 g/kg body weight. However, in the case of 10-12 hours of training per week, protein intake of 1.1-1.3 g/kg /day is sufficient (66). Approximately 20-25 g of good quality protein is needed to accomplish the recovery time at maximum speed after exercise (54, 67). It is stated that the protein taken after exercise has more impact on muscle protein synthesis and increases muscle repair (68).

In stable training periods, a daily intake of more than 1.7 g / kg of protein is not recommended as it has no additional benefit to the formation of hypertrophy and it has been determined that it increases amino acid catabolism and protein oxidation (69, 39). However, it is known that most of the athletes have daily protein intake more than the recommended amount (70). It is stated that excessive protein intake affects kidney

functions. The kidneys filter out liver waste, including urea which is one of the waste products of protein metabolism (71). Ammonia resulting from excessive protein intake is transported to the kidneys through the blood to be excreted in the urine by forming urea. Therefore, excessive protein intake constitutes an additional burden on the kidneys (72). At the same time, high protein diets can cause dehydration. High protein intake increases energy intake and the total fat of the individual.

High-protein foods, such as whole-fat meat and dairy products, constitute an important source of total fat, saturated fat and cholesterol content, and these nutrients have been found to be positively related to cardiovascular diseases and some cancers. Because of the high amount of total energy in foods containing high protein, health and its performance are affected negatively and it results in weight gain (73). Dietary excess protein intake may also affect bone-mineral balance due to its effects on calcium excretion and acid-base metabolism.

In order to maintain the pH balance of the body, this acid must be emptied or buffered. When the acid levels rise, there is a breakdown of calcium, a buffering agent from the bones, and the calcium excretion in the urine is increased. Therefore, excessive protein consumption is reported to increase the risk of osteoporosis. Excessive consumption of animal proteins relative to plant proteins increases this risk. Therefore, people who exercise should pay attention both to the daily intake of enough calcium and enough protein intake (74).

Consumption of protein (0.2-04 g/kg/s) along with up to 0.8 g/kg/s carbohydrate accelerates muscle glycogen fulness after exercise. As a result, the protein required by athletes is about 0.3 g / kg of protein 4 to 5 times a day for muscle gain, adaptation, growth and recovery (54).

2.3.3.1.3. Soccer and Fats

2.3.3.1.3.1. Fats

Fat is a necessary diet component associated with vitamins A, D, and E and forms the basic elements of cell membranes and provides energy (58). Fats are hydrophobic, lipophilic and organic, carbon-containing compounds (40). More than 95% of the pure fat is triglyceride. A small amount of diglyceride and mono glyceride also exist. While two fatty acids are added to the glycerol in the diglyceride, one fatty acid is added in the monoglyceride. Based on the number of carbon in the molecule and the presence of double

bonds between carbons, it is called short, medium, long chain fatty acids. The fatty acids contained in the nutrients are categorized assaturated and unsaturated according to the number of bonds between carbon atoms (33).

Fats such as animal fat found as solids at room temperature are referred to as saturated fats. 7 to 8% of a diet in which 25-30% of daily energy is supplied from fats should be provided from saturated fats. Butter and tail fat are among this fat group. Milk oil, egg yolk, meat and meat products, coconut oil, cocoa and palm oils, liver, kidney, brain, sheep's head, tripe, trotters, heart, tongue, spleen-like offalings, processed meat products such as sausage, sausage, salami, ham, bacon, internal oil, tail oil, butter, cream, pastry and bakery products such as cakes, pies, cookies, biscuits, chocolates, wafers, cakes contain saturated fat (33). Since saturated fats cause cardiovascular diseases, the total fat content and the fat content in the nutrients have critical importance (75).

Unsaturated fats are liquid at room temperature. Vegetable oils such as olive oil, corn oil, sunflower oil and hazelnut oil are in this group. Unsaturated fats are beneficial in terms of health, helping to achieve the desired level of cholesterol and prevention of various types of cancer and arthritis. Recently, omega-3 fatty acids have attracted attention due to their positive effects on the cardiovascular system and inflammation. Research has shown that these fatty acids are protective by lowering triglyceride levels and blood pressure and reducing the development of atherosclerotic plaque and inflammation. Due to these positive effects, it is recommended that individuals increase the intake of omega-3 fatty acids. Furthermore, these fatty acids are essential for retinal and brain development and health (75). The American Heart Association recommends that at least two servings of fish per week (EPA and DHA) as well as plant sources of omega-3 fatty acids (alpha-linolenic acid) are consumed at least twice a week. The balance between omega-6 and omega-3 is also important. If the intake of omega-3 fatty acid is greater than omega-6, the body cannot sufficiently benefit from omega-3. For this reason, WHO has reported that the omega 3:omega 6:omega 9 balance should be at most 5:7:1 (32).

Fats form approximately 15-20% of the adult human body (33). Visceral and subcutaneous fat protect the vital organs and provide protection of the body against cold and balancing the body temperature. It provides protection for the skeletal muscles and also prevents the heat from getting out of the body by balancing and maintaining body

temperature. Furthermore, fats are involved in the formation of myelin sheath in nerve cells (76).

When fats are broken down into glycerol and fatty acids, some are used for energy and some are stored in the body. Others are used in body functions by joining the structure of cholesterol and some hormones (33). It helps in the absorption of fat-soluble vitamins and plays an important role for corticosteroid hormones and coenzyme Q to perform their functions (32). Fats, which form an important part of the daily diet, provide a high amount of energy. While 1 g of carbohydrate and protein provides 4 kcal of energy, 1 g of fat gives 9 kcal of energy. Fats meet 60-80% of the body's energy needs at rest (77).

About 98% of dietary fats are triglycerides. Triglycerides serve as a large energy store and are stored in adipocytes. Triglycerides can also be stored in liver and muscle in less amount and can be used as energy during exercise (78).

2.3.3.1.3.2. Fat Metabolism in Soccer Players

Lipids in nutrients are degraded by enzymes known as lipases. Gastric lipase and lingual lipase are involved in the metabolic process and the fats become ready for absorption. In the fat tissues there are receptors sensitive to hormones on the surface of adipocytes. Lipase sensitive to some hormones (adrenaline etc.) break down the triglyceride into adipocytes into fatty acids and glycerol by being active and fatty acids can then be taken up by cells via the fatty acid transporter. 3/4 of the fatty acids from the adipose tissue are transported binding to plasma albumin (lipoalbumin). Glycerol released in fat tissue can not be reused by the fat tissue and moves to blood by leaving the tissue and transported to the liver. It is re-esterified in the liver and added to the VLDL structure as a triglyceride or added to glucose synthesis (gluconeogenesis). The use of fats as an energy source in tissues is called beta oxidation. Fatty acids in the blood in peripheral tissues like muscle is taken into the cell. Furthermore, VLDL which is produced by the liver is used by taking into body cells. Cells take fatty acids and activate them. This activation occurs using 2 molar ATP with acetyl-CoaA synthetase or thiokinase enzyme. Acetyl-CoA is then transported to mitochondria. Acetyl-Coa is used in the mitochondria with beta oxidation in the production of energy (ATP). The energy production potential of fats is higher than that of carbohydrates. For example, while 1 mole of oleic acid (18 carbon fatty acid) oxidation results in 146 mole of ATP, 36 mole of ATP is produced from 1 mole of glucose (4).

2.3.3.1.3.3. The Role of Fats in Soccer Players

Fats and carbohydrates are used as energy sources during exercise. While fats are the main source of energy in low-intensity training and exercises, carbohydrates are the main source of energy in high-intensity training and exercises (33). In exercises lasting less than 90 minutes, the body uses carbohydrates and fats for energy (40). In the exercises lasting longer than 90 minutes, 90% of the energy is supplied from the fats due to depletion of glycogen stores (41). Insufficient total daily energy intake and low fat content of the diet may cause negative energy balance in individuals. Negative energy balance adversely affects the performance of the individual during exercise. Therefore, the fat and energy intake of individuals should be balanced with the targets of ideal health and weight loss (75). Mostly, the intake of plant origin fats is beneficial in terms of health and performance. Reducing muscle pain due to inflammation and increasing blood flow during exercise can positively affect performance (79). A high amount of fat intake leads to an increase in total energy. Therefore, the increase of body fat causes weight gain. Excessive body fat mass of people exercising affects exercise performance negatively. When compared with glycogen stores, fat tissue is not able to produce energy easily during exercise (80).

2.3.3.1.3.4. Fat Requirements and Consumption of Soccer Players

As the type of fat taken is important in terms of overall health and performance, individuals exercising should consume foods containing a sufficient amount of fat every day from each food group (81). 12-15% of the total energy obtained from fats should come from the monounsaturated fat, 7-10% from the polyunsaturated fat (n-6 fatty acid containing sunflower, corn oil, cotton oil, soy and n3 fatty acid containing fish, fish oil, walnut, flaxseed) and 7-8% from the saturated fat. Daily intake of omega-6 fatty acid should be 5% -10% of daily energy and Daily intake of omega-3 fatty acid should be 0,6-1,2% (33).

Even in very weak individuals, fat stores are capable of providing energy for a few days. In case of a high-fat diet 1 to 2 weeks prior to the the exercise, a theory has been developed that the body will adapt to higher fat intake and that the use of fats will be more efficient to provide energy during exercise (40). Most individuals state that a high-fat meal consumed 1-4 hours before the exercise leads to gastrointestinal problems such as bloating, diarrhea, stomach cramp and feeling of fullness. Therefore, it is not recommended to consume a high-fat meal just before exercise (52). Compared to high-carbohydrate meals,

there is no benefit of consuming high-fat foods before exercise (82). Consumption of high-fat foods is not recommended as it will reduce carbohydrate intake. Furthermore, it is known that it causes muscle glycogen stores decrease (83). Therefore, diets providing sufficient carbohydrate intake and containing 25-30% fat should be offered to individuals in terms of providing weight management assistance (58). High fat diet is found to increase the triglyceride store in the muscle after exercise. If he total fat content of the daily diet is more than 30%, this will cause an increase in body fat mass (81).

Recommendations for fat intake should be individualized and provided to be in line with the body weight, body composition and exercise performance objectives (48).

2.3.3.2. Soccer and Micro Nutrient Relationship

2.3.3.2.1. Soccer and Vitamins

Vitamins act as regulator in many metabolic reactions of nutrients and regulate metabolism. They serve in the control of tissue synthesis process, protection of plasma membrane cells, oxidative metabolic functions (4).

In terms of general characteristics, vitamins are examined under 2 groups which are fat-soluble (A, D, K and E) and water-soluble (B and C) (32). Fat-soluble vitamins are stored in the body. Water-soluble vitamins cannot be stored in the body and should be taken regularly. It is stated that the best sources for many vitamins are the consumption of fresh vegetables and fruits (33).

2.3.3.2.1.1. Water Soluble Vitamins

Water-soluble vitamins contain vitamin C and eight vitamin B complexes. These are thiamine, riboflavin, B_6, niacin, folic acid, B_{12}, biotin and pantothenic acid. These organic substances are easily soluble or miscible in water. Because they are water-soluble, they tend to be excreted easier. It is important that these micronutrients are regularly taken up because of the small amount of water-soluble vitamins stored in the body. Since water-soluble vitamins act as coenzymes in the body, they play a role in the metabolic and biochemical process related to the formation of energy from carbohydrates, fats and proteins (40).

Thiamine, riboflavin (as mitochondrial electron transport FAD) and niacin (as FAD and NADP in multiple metabolic pathways) are involved in the production of energy in endurance sports. It is recommended to consume daily on main meals and with snack foods

(40). Pridoxin (Vitamin B_6) is involved in the synthesis of amino acids. Folate is involved in the synthesis of red blood cells. Pantothenic acid is involved in oxidative metabolism (CoA).

2.3.3.2.1.1.1. Tiamin (Vitamin B_1)

Thiamine means amine involving sulfur. Thiamine is formed as a result of the binding of a molecule pyrimidine to the thiazole group via a methyl bridge (50). Thiamine (B_1) acts as a pyrophosphate in the metabolism of carbohydrates and branched chain amino acids. Thiamine is a coenzyme that catalyzes the conversion of pyruvate dehydrogenase to acetyl-CoA. Thiamine reduction in the cell reduces enzyme activation. Thiamine reduces ATP biosynthesis and leads to fatigue. Thiamine energy intake is 0.12 mg/239 kcal (84). Thiamine is present in yeast, pulses and fortified cereal and bread (4).

2.3.3.2.1.1.2. Biotin (Vitamin B_8)

Biotin has to be converted to coenzyme form with the assistance ATP and Mg to be effective in the body. The function of biotin in metabolism as a coenzyme is to participate in the breakdown of amino acids and in the synthesis of fatty acids (85). Biotin is synthesized by bacteria in the intestines of humans and animals. Biotin is found in tissues free or bound to proteins. Biotin is effective in fat, amino acid and carbohydrate metabolism and is important for hair and skin health (86). Biotin is found in almost every food. Egg yolk, liver, kidney, yeast, cauliflower and tomato are the best sources of biotin. Avidin in raw egg white prevents the absorption of biotin. The effect of this substance is lost when the egg white is cooked. When too much raw eggs are consumed and excessive antibiotics are taken, biotin deficiency may be seen. Symptoms of deficiency include fatigue, loss of appetite, disorders in the skin, nervous and digestive system, hair greying and shedding. Excessive biotin is excreted with urine and feces.

2.3.3.2.1.1.3. Vitamin B_{12} (Cyanocobalamin)

Vitamin B_{12} has the most complex structure among B group vitamins. This vitamin is also called cobalamin since there is cobalt in its structure. (87). Its commercial form is cyanocobalamin. Cyanocobalamin is produced by the attachment of the cyanide group to the cobalt atom. When adenine is active using ATP in place of benzyl-imidazole in the molecule, Cyanocobalamin shows coenzyme activity (50). Cyanocobalamin is effective in carbohydrate, fat and protein metabolism. Cobalamin is mainly involved in blood formation and has an important role in growth. Vitamin B_{12} is not found in plant foods. It

is abundant in liver, kidney, heart and shellfish. Red meat, fish, skimmed milk powder and egg are also among the best sources of vitamin B_{12}. If enough animal nutrition is found in the diet, the vitamin needs of healthy people are met (87).

2.3.3.2.1.1.4. Vitamin C (Ascorbic Acid)

The chemical name of vitamin C is ascorbic acid. In terms of composition Vitamin C is similar to six carbon simple sugar. Although it can be synthesized by plants and some animals, it is the most unstable vitamin that cannot be synthesized in human body and must be taken with foods. Vitamin C strengthens the body's defense system, plays a role in the metabolism of amino acids. It is necessary for collagen synthesis. Vitamin C also ensures strong bones and teeth and provides healthy and durable walls of blood vessels, reduces the severity of allergic reactions, provides easy healing of wounds and burns, plays a role in the use of iron and folic acid in the body. Vitamin C is an important antioxidant that protects the body from free radical damage. Oxidative stress that occurs during competition sports and high intensity exercise protects the tissues of the body and protects the immune system from disease and helps fight the disease. Vitamin C helps with iron absorption (88). Green and red pepper, dark green leafy vegetables, tomatoes, citrus fruits such as oranges, lemons, strawberry, peach, rosehip, carrot, tomato, parsley, pepper are the best sources of vitamin C (87).

2.3.3.2.1.2. Fat Soluble Vitamins

Fat-soluble vitamins are vitamins A, D, E and K. They are chemically water-insoluble or immiscible, but are soluble in fat. Fat-soluble vitamins can be stored in the body for a long time (58).

2.3.3.2.1.2.1. Vitamin A

Elements with vitamin A activity are included in the steroid group. Combined isoprenes build molecules that carry vitamin A activity. Molecules showing vitamin A activity are divided into two. These molecules are those that show vitamin A activity (retinol, hydroretinol, retinoic acid) in animal tissues and in vegetable foods (conversion of some carotenoids found in yellow-orange pigment to retinol) (50). Vitamin A has antioxidant properties. It is recommended that athletes consume 1000 mg of retinol or 6000 karg of B-carotene. It can be said that there is a deficiency if athletes serum retinol values are less than 10ug / dl. If the values are greater than 60 ug / dL, it can be said that there is

excessive consumption (89). As a result of inadequate intake of vitamin A, night blindness, bitot stain, xerophthalmia and follicular hyperkeratosis are seen. (4).

2.3.3.2.1.2.2. Vitamin D

Ergesterol in plant tissues and 7-dehydrocholesterol in animal tissues is converted to Vitamin D by the effect of ultraviolet rays (50). Vitamin D acts as a hormone, although it is classified as a fat-soluble vitamin (4). Vitamin D is necessary for bone health and is related to the absorption and regulation of calcium. The normal values of vitamin D vary depending on geographical location and race (90).

In terms of 25-hydroxy vitamin D levels, 30 ng / ml can be considered as safe (91). Vitamin D has an important role in preventing stress factors for athletes and in optimizing bone health which are of great importance for athletes (92).

In a study conducted in Qatar, 30% of 506 national athletes from soccer, handball, volleyball and basketball branches have been shown to have vitamin D deficiency and 37.2% of them have vitamin D insufficiency (93). In one study, in 19.1% of athletes vitamin D was observed to be sufficient, in 50.6% of them it was insufficient intake and in 30.3% of them it was insufficiecy (94). Therefore, vitamin D in athletes should be measured twice a year (4).

2.3.3.2.1.2.3. Vitamin E

Vitamin E is the toxin and tocotrienol derivatives that show biological activity. The most important of these are alpha, beta and gamma tocopherol and alpha and beta tocotrienol. Alpha-tocopherol is the standard E activity. Among these, alpha tocopherol is the one showing Standart vitamin E activity (50). Vitamins E play an important role in the protection of cell membranes from oxidative damage (American Dietetic Association, 2009). Iron is responsible for the production of oxygen-carrying structures and for energy production of. It is recommended to consume on main meals and with snack foods after long and intense exercise (40).

2.3.3.2.1.2.4. Vitamin K

Vitamin K is defined as poliquinone derivatives showing biological activity. It is found in most animal and vegetable foods. Vitamin K deficiency is uncommon (50). Any role of Vitamin K in exercise has not “been determined’’ (4).

2.3.3.2.2.2. Soccer and Minerals

As a result of the food burning in the body, the remainder is the inorganic substances found in nature. Minerals which are vital for body functions are divided into two groups as macro minerals and micro minerals (trace elements) according to the amount required by the body. The macto minerals that are essential for the human body and requireed in high amounts are calcium, phosphorus, potassium, sodium, chlorine magnesium and sulfur. Micro minerals are iron, zinc, selenium, iodine, copper, fluorine, cobalt, manganese, molybdenum and chromium. An average of 6% of the adult human body is composed of minerals. The minerals in the body have two main roles as constructive and regulating. In terms of the constructive role; calcium and phosphorus are required in the formation of the basic structure of the skeleton and teeth. Sulfur is necessary for hair and insulin, iron is necessary for blood production, zinc is necessary for the immune system, growth and development. In terms of their regulatory role, the body's acid-base balance, fluid electrolyte-balance, muscle contraction, and nerve conduction are among the functions of minerals. It is involved in enzymes as a cofactor. If the need for calcium, iron, iodine and fluorine is met sufficiently, all macro minerals and trace elements are met. Several factors may affect the bioavailability of minerals. The absorption of minerals is affected by the pulp content of the food. In some cases, the high level of a supplemented mineral may compete for absorption and reduce the absorption of other minerals. Potassium is the electrolyte that is lost when the players sweat. It is appropriate to consume main meal and snack foods after exercise. Small amounts can be consumed during exercise.

Calcium is very important for bone strength in soccer players. It is recommended to consume on main meals and as snack foods daily (40).

2.3.3.2.2.1. Iron

An adult human body has an average of 3-5 grams of iron. Most of the iron is found in red blood cells in hemoglobin. The function of iron which is found in the structure of hemoglobin is to carry oxygen. Hemoglobin carries oxygen from the lungs to the cells and carries carbon dioxide from the cells to the lungs. Meat and meat derivatives, egg, green leafy vegetables and grains are the source of iron. Molasses and dried fruits are also a good source of iron. The diets involving vitamin C and meat increase the absorption of vegetable derived iron. Therefore, foods rich in vitamin C should be included in each meal. Along

with anemia, iron deficiency affects mental and physical performance and general health (22).

The iron requirement of endurance athletes (especially in runners) can increase by approximately 70% (95). The fact that the increase in plasma volume during exercise dilutes serum iron relatively is a possible mechanism that causes low serum iron (athletic anemia) (96).

2.3.3.2.2.2. Calcium

99% of calcium is contained in the bones with phosphate. The calcium in the bone is found in the form of hydroxy apatite which is a crystalline phosphate structure surrounding the organic collagen matrix (50). The bone is a dynamic tissue in a state of restructuring with continuous destruction and construction. Calcium in bones provides not only the consistency of bones but also used for the blood when required. Calcium, along with the phosphate in the body gives the consistency of hard tissues such as bone and teeth. Furthermore, it is necessary for blood clotting. It plays an important role in the working of heart and muscles. It mediates the functioning and secretion of many hormones. Inadequate calcium intake allows calcium to pass from bone to blood which weakens the bones. Milk, yogurt, cheese, green leafy vegetables are good sources of calcium (24). Insufficient calcium intake within diets along with high-intensity trainings leads to low serum calcium levels and high bone density (97).

2.3.3.2.2.3. Magnesium

Magnesium plays various roles in glucose, fat and protein metabolism in the cell. 60% of magnesium in the human body is in bones and teeth. The remaining 40% are in blood, tissue and other body fluids. Magnesium is more intense in the brain and heart than in other tissues. Although magnesium is present in an amount of 0.05% of human body weight, it is involved in hundreds of enzyme reactions in our body. Magnesium in the soil is used by plants. Similar to the iron-hemoglobin relationship in humans, magnesium enters the chlorophyll structure in plants (98). The need for magnesium varies according to age and lifestyle. Dark green vegetables which are the main ingredient of chlorophyll, cereals, fish, almonds, hazelnuts, peanuts, walnuts, soybeans, asparagus, onions, tomatoes, carrots, celery, leek, gruyere cheese, dates, black radish, sunflowers, cocoa, bananas and hard water are rich in magnesium (99).

Many new findings supports the hypothesis that magnesium and zinc play an important role in the development of strength and cardiorespiratory function in healthy individuals and athletes (100).

2.3.3.2.2.4. Zinc

Zinc is cofactor for the activity of 100 enzymes. Major activities are RNA polymerases, alcohol dehydrognase, carbonic anhydrase and alkaline phosphatase. These enzyme systems are related to the synthesis of nucleic acid, protein and immune cells (50).

Decreases in body weight reduce the amount of zinc, which leads to hidden fatigue and a decrease in performance. 90% of athletes doing endurance sports often implement an unusual diet program to improve performance. Excessively high carbohydrate and low protein-fat intake may cause zinc intake below the optimum level. It is difficult to precisely determine the zinc deficiency which is very low. The zinc deficiency in athletes can lead to anorexia, significant decrease in body weight, hidden fatigue due to reduced endurance and osteoporosis.

Usually unnecessary zinc supplements that cause this amount to exceed; can cause low levels of HDL cholesterol and nutrient instability by affecting adversely the absorption of other micronutrients such as iron, and copper.

2.3.3.2.2.5. Sodium-Potassium-Chloride

Sodium is an important electrolyte especially for athletes who lose a large quantity of water. Athletes doing endurance sports require more sodium (2.3 g) and chlorine (3.6 g) than the upper intake. Sports drinks containing sodium (0.5-0.7 g/L) and potassium (0.8-2.0 g/L) are as important as carbohydrates, especially for endurance athletes (> 2 hours) (4).

2.3.3.2.3. Soccer and Water

After oxygen, water is the second source of life to maintain life. In addition to providing structural integrity to the cells, it is also involved in the transport of nutrients and removal of waste. In addition, substances such as carbon dioxide, lactic acid and ammonia formed during the breakdown of nutrients are removed from the cells. Water is usually found in many of the chemical reactions that occur in the body. Water also serves as the solvent for many important molecules, such as glucose, some vitamins and minerals, proteins and enzymes. It helps to maintain a balanced body temperature (52, 79). It plays a

very important role in maintaining the body's acid-base balance. Like hemoglobin, it is involved in the transport of proteins. Approximately 80% of the daily water requirement is provided from liquids, while less than 20% of the requirement is provided from fruits, vegetables and other foods. The remaining part is formed by the body during cellular metabolism (40, 79).

Water consumption is the most important issue for an individual exercising. Although it does not provide energy to the body, it is the most necessary nutrient (52). About 55-60% of the body weight of an average person is water. About 70% of the muscle tissue of individuals exercising is water and this is another reason why water is very critical for exercise performance (40). Balance of water intake and daily water loss play a critical role in the prevention of hydration as well as the effects of dehydration (41).

2.3.4. Nutrition Before Training/Competition

Athletes are always in search of foods that can maximize their performance before the competition. The purpose of nutrition before the competition / training is to prevent hunger, to provide the necessary fluid and to provide the additional energy (especially from carbohydrates) needed during competition / training (29).

To be hungry before training does not mean any thing in physiological sense. Staying hungry consumes quickly the liver and muscle glycogen and disrupts the work out performance. It should be taken into consideration that the athlete's choice of food and nutrients are digestible when planning pre-match meal (24). In order not to be affected by nausea, vomiting, cramping and fatigue, it is necessary to feed in sufficient amounts 3-4 hours prior the competition. Food should contain low fat, pulp and caffeine. Protein should be in moderate level, complex carbohydrates and liquid should be in high amounts (101).

The digestion and absorption of carbohydrate is faster than protein or lipid and energy is obtained faster. Thus, it helps to reduce the feeling of fullness after eating. A high protein meal increases the metabolic rate at rest compared to a high carbohydrate meal, since digestion and absorption of proteins requires more energy. This additional thermal effect can compel the body's heat dissipation mechanisms and weaken exercise performance in hot weather. For energy production during exercise water is needed when the protein is catabolized and this can cause dehydration. Approximately 50 mL of water is needed for one gram of urea excretion. In addition, the accompanying stress and tension before the competition reduces the intestinal absorption by decreasing the blood flow to the

digestive tract, so on the day of the competition, the intake of foods with high fat and protein content is not recommended as they are digested more slowly than the same energy-containing carbohydrates. It takes 3 to 4 hours to digest, absorb and store the pre-match meal, which is rich in carbohydrates. Extending this period adversely affects the regeneration of glycogen and the endurance of the next exercise (24).

Pre-match nutrition should be made at least one hour before the exercise which will be done before the competition. High-quality protein uptake, which contains about 10 g of essential amino acid (0.25-0.3 g / kg (15-20 g) protein), provides the best protein synthesis (68).

2.3.4.1. Carbohydrate Consumption Before Training/Competition

At least 1g / kg carbohydrate sources with low glycemic index which contain protein sources and compensates for increased carbohydrate oxidation should be preferred in the pre-sport meal. Carbohydrate uptake should be ceased 5-15 minutes before the start of exercise. Because the performance and metabolic effect of carbohydrate taken less than 15 minutes before the exercise is similar to the carbohydrate taken during exercise. Carbohydrate should be consumed during warm-up due to the high intensity of the warm-up activities. Because it was concluded that when consumed it can prevent glucose and insulin rises before competion as a result of catecholamine-induced insulin inhibition (102, 67, 103). In the pre-match meal, carbohydrate-rich diet rather than protein should be preferred. The main source of energy for short anaerobic activity and high intensity aerobic exercise are carbohydrates provide renewal of liver and muscle glycogen after night fasting (24).

There are studies suggesting that carbohydrate consumption before the competition will affect the performance positively. The type and amount of carbohydrate consumed is also important. The amount of carbohydrate to be consumed 3-4 hours before the competition is 150-300 g (3-5 g / kg carbonhydrate). Carbohydrate consumed before the competition provides the maximum level of muscle and liver stores. Consumed carbohydrates should be preferred from complex carbohydrates to prevent sudden gastric emptying and to prevent sudden sugar level increase. Complex carbohydrates increase blood glucose levels more slowly than simple carbohydrates. (104). The combination of a high carbohydrate pre-match meal and a sports beverage consumed provides more exercise capacity than a high-carbohydrate meal alone (105). It was observed that glutamine and

maltodextrin, a type of carbohydrate taken two hours before the exercise, prevented the decrease of anaerobic muscle strength and increased physical performance in multiple repeats (106).

2.3.5. Nutrition During Training/Competition

During exercises lasting 1 hour or less, dehydration does not reduce durability performance (40). However, it is recommended to consume some beverages during the competition lasting longer than 1 hour or during the halftime (16).

Fluid consumption should be increased during exercise. Since dehydration decreases digestion, fluid should be taken during exercise (29). Consuming small amounts of fluid every 15-20 min intervals may increase gastric emptying. Furthermore, the supply of carbohydrates to the muscles and the central nervous system may be compromised during training or during the match, as the fuel cost of an athlete's training or racing program exceeds endogenous carbohydrate stores (38). Carbohydrate intake during exercise provides a high level of carbohydrate oxidation, prevents hypoglycemia and has a positive effect on the central nervous system (107).

Carbohydrate should be taken up to 30g/h in soccer (38). Even if it is not possible to takeup, routine rinsing of carbohydrate solutions during exercise may have a beneficial effect on durability performance of about 1 hour (108). The solution of 20-25 mL sports drink containing 6% cho can be rinsed in the mouth approximately every 8-10 minutes and for 5-10 seconds (40). Hypertonic beverages containing more than 8% carbohydrates should be avoided. Juice or concentrated beverages containing 10-12% cho can increase the risk of nausea, cramps, diarrhea. The drink should contain sodium (10-30 mmol/L) to prevent fluid absorption and hyponatremia (sodium levels falling below 135mEq/L) (38). During the exercise, different kinds of sports drinks, The hydration plan should be tested in the intestines. An untested food or drink should never be consumed during the competition (109, 110).

2.3.6. Nutrition After Training/Competition

The process of normalization of physiological and metabolic changes due to exercise or competition is called recovery. Food intake is one of the most important factors affecting recovery. Most athletes consume carbohydrate and protein together after the exercise, in the form of foods, drinks and supplements containing macro nutrients (111).

After competition meal should be within 2 hours after the exercise (68). In order to be ready for the next exercise period by replenishing the glycogen stores very quickly after the match or exercise, the intake of meals and daily total nutrients after exercise is very important. Because the rate of muscle glycogen resyntheses in the first 2 hours after exercise increases by 150%; between 2-4 hours, muscle glycogen resyntheses occurs at a rate above normal; after 4 hours, this speed falls to the normal level and as time progresses falls below this level. In order to fill the emptied muscle glycogen stores at best level after exercise, food consumption should be done as quickly as possible after exercise (27). If the muscle glycogen falls below the safe level; a risk of consuming the brain hypoglycemia occurs (112).

In athletes with a recovery time of more than 8 hours, the delay at the initial feeding time can be compensated (there is no difference between taking it immediately or after 2 hours) and the frequency of taking carbohydrates does not affect glycogen stores (113, 54, 114)

2.3.6.1. Carbohydrate Consumption After Training/Competition

It is well known that carbohydrate consumption plays a critical role in muscle glycogen synthesis after exercise. Failure to regenerate the glycogen stores may cause fatigue and cause the athlete's training performance to reduce in subsequent sessions (115).

Carbohydrate should be consumed immediately after the competition. It has been reported that glycogen synthesis rates are low until carbohydrate diet begins, and that taking carbohydrates immediately after a long period of exercise leads to higher amounts of glycogen storage than taking the same amount of carbohydrates 2 hours after the exercise (54, 114). Especially in extensive long-range runnings, carbohydrates should be given immediately after the competition at 2-hour intervals. After the competition, carbohydrate intake should be approximately 600 g in 24 hours. It can be divided into 50 g every 2 hours. The targets for carbohydrate should be given in grams, based on the body mass of the athlete, instead of the percentage of total energy intake. Rather than emphasize a high or low carbohydrate diet, carbohydrate availability should be considered according to muscle fuel needs (116).

After the training, the athlete must consume 1.2 g / kg of carbohydrate in addition to the carbohydrate needed daily. Carbohydrate consumed during and immediately after training reduces the increase in stress hormones and reduces the degree of immune suppression. Failure to regenerate the glycogen stores may cause fatigue and compromise

the athlete's ability to train at high intensity in subsequent sessions (115). Athletes who have limited time to recover between successive training sessions should prioritize carbohydrate and fluid consumption to improve future athletic performance (117).

Consumption of fruits such as cherries, pomegranates and blueberries can be a very good option both for recovery and for antioxidants and phytochemicals (118).

Different from this study, glycogen regeneration rates did not increase when carbohydrate was given 1.6g/kg/h (55). If carbohydrate intake is sufficient (>1g/kg/h), the uptake of the protein with carbohydrate will not provide additional benefit for glycogen synthesis (119).

2.3.6.2. Protein Consumption After Training/Competition

Immediately after exercise, protein uptake (especially leucine) provides amino acid source for muscle growth and repair. About 10g of the essential amino acid (0.25-0.3 g / kg (15-20g) protein) content of high-quality protein gives the best protein synthesis response (31). Especially meal per 3-4 hours and in every meal 20g protein in the leucine-rich fast absorbable form should be preferred (114). This amount is also thought to be sufficient for muscle protein synthesis (9).

It is supported by the conducted studies that for recovery 20–25 g protein is needed in snack foods or beverages. Although many combinations of nutrients can be provided according to these recommendations, only 1 scoop of whey protein is sufficient to provide ~ 2-2.5 g of leucine and 20-25 g of protein. In addition to protein, carbohydrate requirements must be met simultaneously. Maltodextrins or other high glycemic index carbohydrates are good options to renovate liver and muscle glycogen stores.

In a recent study, it has been shown that in the intensive competition period, the support of the protein after the competition contributed the fast recovery, increased the performance and strength specific to soccer and provided protection for the antioxidant (120). In order to increase protein synthesis and allow for repair and adaptation, soccer players should take 0.25-0.4 g/kg protein during the early recovery period (118, 9). There are studies supporting the 30-40 g casein uptake before sleep for maximum stimulation of muscle protein synthesis at night after strength training (121).

As a result, taking high amounts of carbohydrates may not be practical for the athlete. Therefore, it would be more appropriate to take protein along with carbohydrate after exercise for re-storage and repair of skeletal muscles (114, 122).

2.3.7. Liquid Consumption in Soccer Players

The need for liquids can be met by means of water, water-containing beverages and foods. Although fruit juices, milk, coffee, tea and soda contribute to the need for liquids, water is the best choice considering the energy intake. Beside the need for liquid, fruit juices and milk also contribute to the need for macro nutrients as well as vitamins and minerals. Caffeine drinks have a diuretic effect, while carbonated drinks contain high amounts of sugar. Carbonated beverages should be consumed carefully as they contain artificial sweeteners. Foods contribute to total fluid intake in terms of water content. Fruits and vegetables have a high water content of over 70-90%. Meat, milk and cereal products have a lower water content.

In terms of calories, water is the best choice. Water is critical to maintaining overall health and performance. Proper daily water intake prevents harmful effects of dehydration, including metabolic and functional disorders. Daily average 3.7 liters of water is recommended for men older than 19 years old. This daily amount includes water as well as the total amount of water taken from food and beverages. Under normal conditions, the liquid requirement for an average individual is associated with total energy intake. It is stated that about 1 mL of water is needed for each 1 kcal of energy consumed. The higher the energy requirement, the higher the liquid requirement.

Glucose molecules can be stored together with water as glycogen in the body. 3 g of water is stored to store 1 g of glucose. Water produced by the breakdown of glycogen during exercise may be useful in preventing dehydration (79,40).

Cold (0-5 degrees) or cool (15 degrees) drinks are most preferred by soccer players. However, beverages at room temperature (20 degrees +) help to increase consumption. The temperature of the liquid to be recommended at 15-21 degrees makes it easier to consume, while it provides a faster absorption process in the gastrointestinal tract (123).

2.3.7.1. Liquid Consumption Before the Exercise/Competition

If the intake of fluid before exercise is avoided, an earlier fatigue, dizziness, increase in body temperature and faster increase of heart rate occur. Excessive fluid intake before exercise causes frequent urination (124). At 10 degrees centigrade 2L/h and at 25-35 degrees more than 3 L/h loss of sweat is observed in soccer players. The loss is equivalent to about 0.8-2% of body weight loss (125, 126). So starting 4 hours before the exercise until exercise, 5-7mL/kg should be consumed (68). If the person cannot urinate, or

if the urine color is a dark and dense urine, 2 hours before the exercise, he or she should slowly take a little more liquid (about 3-5mL/ kg) (38).

2.3.7.2. Liquid Consumption During the Exercise/Competition

The 2% sweat loss during exercise reduces the performance (127). During exercise, liquid should be consumed every 15-20 minutes at 400-800/hour, and in 10-15 minutes at hot weathers (68).

2.3.7.3. Liquid Consumption After the Exercise/Competition

Loss of 2% of body weight can cause a decrease in sportive performance. The replacement of the liquid lost with sweat after exercise is part of the preparation for a new exercise period. Both the water and the salt lost with sweat should be replaced. 1.2-1.5 kg of water should be consumed for each weight lost during exercise or competition (54). Following liquid loss, liquid consumption can improve the performance of training in heat and stress conditions (117). 1.25-1.5 L liquid consumption is recommended for every 1 kg body weight after training (67).

2.3.8. Body Liquid Balance in Soccer Players

Approximately 60% of body water is lost in the urine at rest. However, during exercise, sweat formation can cause 90% of water losses. Sweat formation is associated with temperature, humidity, exercise intensity and duration of exercise. At the same time, unlike perspiration, a 24-hour water loss occurs at a very slow rate from the skin. Approximately 15% of the water lost per day is lost other than the sweat and this contains water lost while breathing (40). Exercise which greatly increases the rate of breathing increases the loss of water through respiration. The only way to maintain hydration daily is to ensure that daily water intake equals daily water loss. Water intake equal to water loss indicates that water balance has been reached (79).

While the body temperature is kept constant at 37 ° C at rest, the body temperature increases to 38-40 ° C with the production of metabolic heat during exercise and competition (128,129). Increase in the body temperature is prevented by allowing the heat to evaporate on the body surface by means of perspiration. In addition to water, sweating causes electrolyte loss. The top of the electrolytes excreted with sweat are Na, K, Mg, Fe and Ca.

By measuring the athlete's weight before and after the exercise it can be understood how much liquid he or she lost during the exerise period. In order to maintain the liquid balance in the body, it would be appropriate to consume liquid 1.5 times of the weight lost (16).

2.3.9. The Impact of Alcohol and Smoking in Athletes

Alcohols constitute a significant group of chemicals. The definition of alcohol directly refers to ethyl alcohol (ethanol). Ethyl alcohol is used as a kind of drink that gives intoxication (130). The alcohol is absorbed into the blood from the stomach and small intestine in a short time. Five minutes after ingestion, alcohol is detected in the blood. When the stomach is empty, the alcohol mixes faster into the blood. The majority of alcohol, 90-95% is metabolized in the liver (58). Alcohol is not stimulant in general. It is a sedative agent. It reduces the functional efficiency of the body. It also negatively affects vision. When taken in large quantities, it has hypnotic effect because it brings sleep (131).

Excessive use of alcohol may hinder physical performance. In individuals who are diagnosed with alcohol dependence, muscle damage and muscle weakness are seen in certain degrees**.** At the same time, alcohol causes blood vessels to expand. If the injury occurs, it may cause more swelling of the injured area and prolongation of the healing process. Alcohol consumption can cause performance to decrease by 10-20% (132).

In a study conducted in New Zealand, it was observed that alcohol consumption increased with the increase of the interest of individuals in sports (133). In this context, it was reported that athletes consumed twice as much alcohol as other people and their negative symptoms were more severe. The basis of this excessive alcohol consumption of athletes is to increase socialization and self-confidence and provide energy. Alcohol consumption for athletes (80%) is in the first place for socialization purposes (134).

It has been reported that alcohol lead to the emergence of magnesium and potassium deficiency symptoms by increasing their excretion. Along with lack of alcohol in terms of proteins, minerals and vitamins, it prevents the absorption and use of vital nutrients such as thiamine (vitamin B1), 22 vitamin B_{12}, folic acid and zinc (135). Furthermore, as niacin, riboflavin, thiamine and vitamin B_6 requirements increase in case of excess alcohol intake, symptoms due to the deficiency of these vitamins are common in alcoholics (58).

It has been detected by many researchers that Vitamin C, which is an antioxidant and reduces oxidative stress, is found in low levels in smokers' blood, tissue and other biological fluids. Even inhalation of cigarette smoke reduces the vitamin C level by accelerating the metabolic cycle and destroying its absorption from the small intestine (136). It has been reported that smoking reduces the absorption of calcium in the body and causes bone loss due to a decrease in estrogen levels (32).

2.4. SOCCER AND ERGOJENIC SUPPORT

2.4.1. What is Ergogenic Support?

Ergogenic support is a Greek word, which is derived from the combination of the words ergon (work) and genon (to produce) (98). Ergogenic support; any substance, formation, or procedure that leads to an increase in strength, speed, response time, or durability (36). The ergogenic support by athletes is the elements, treatments and strategies used to develop the performance and to improve performance over the effect of normal training (11).

2.4.2. Classification of Ergogenic Supports

Ergogenic supports are under 5 groups which are biomechanical, psychological, pharmacological, nutritional and physiological.

2.4.2.1. Biomechanical Ergogenic Supports

Biomechanical ergogenic supports provide efficient use of energy and better mechanical advantages to athletes. For example; an appropriate tennis racket can help athletes make fewer mistakes and hit the ball at higher speed. In sports such as skiing and skating, skiing that reduces the impact of the wind helps acceleration.

2.4.2.2. Psychological Ergogenic Supports

When there are important factors that adversely affect the performance of athletes, mental strategies are taught by sports psychologists in order to increase mental power and to help athletes overcome their fears and provide their concentration. For example; visualization is the type of support frequently used by athletes.

2.4.2.3. Pharmacological Ergogenic Supports

Amphetamines, analgesics, anabolic steroids and other drugs can be used for medical treatment.

2.4.2.4. Physiological Ergogenic Supports

Targeting the functions of the different systems of the body, it is aimed to increase the physical power for energy formation throughout the exercise and to maintain the necessary metabolic functions. For example; by making a muscle larger and stronger, the ability to produce power can be improved, so that athletes can run, swim, and ride faster and longer.

2.4.2.5. Nutritional Ergogenic Supports

Foods are defined as nutrition practices, special diets and strategies used by nutritional support products and athletes to improve performance. This group includes protein supplements mixtures, BCAA, aminoacids, whey protein and casein, glutamine, creatine phosphate, carnitine, vitamin supplements, hydroxy methyl methylbutyrate (HMB), caffeine (137). In studies on nutritional ergogenic supports, the foods which their efficacy is approved and legally supported are whey protein, caffeine and creatine. The most common and most effective ergogenic support is creatine monohydrate (81). Although the use of ergogenic support products is common among soccer players, they do not know the possible risks that may arise from the use of these products (118). The same nutritional supplement should be used in certain special cases. However in some other cases it may impair performance (138).

2.4.2.5.1. Nutritional Ergogenic Supports in Soccer

2.4.2.5.1.1. Sports Drinks

Excessive water consumption causes sodium reduction and hyponatremia in the body. Therefore, consumption of liquids containing an appropriate amount of carbohydrate and electrolyte is important. The contents of the sports drinks include glucose, sucrose, maltose, fructose and glucose polymers. The ideal athlete's drink should remove the thirst, provide enough energy and electrolyte, be absorbed quickly and have a good taste. There are 3 types of sports drinks. They are isotonic, hypotonic and hypertonic.

2.4.2.5.1.1.1. Hypotonic Sports Drinks

They are the drinks that are prepared for the purpose of eliminating the loss of athletes who are not in the intensive training and competition period and containing electrolytes and low levels of carbohydrates. There are less than 4 grams of carbohydrates in 100 mL.

2.4.2.5.1.1.2. Isotonic Sports Drinks

They are the drinks which aim at rapidly replacing lost liquid and electrolytes and contain electrolyte and 6-8% carbohydrate.

2.4.2.5.1.1.3. Hypertonic Sports Drinks

It is used for the replacement of the emptying tanks of the athletes who has high energy needs during the post-exercise recovery period. They should be consumed with isotonic drinks during exercise. More than 10% carbohydrate in sports drinks may delay absorption and may cause stomach cramps, nausea and diarrhea.

2.4.2.5.1.1.4. Consuming Sports Drinks by Athletes

Sports drinks promotes the replacement of losses with exercise and the prevention of dehydration as well as the consumption of liquid. In exercises, dehydration increases thermal stress and reduces plasma volume. Thus, fatigue and injury are more common. The ideal amount of carbohydrate consumed by athletes should be between 6-8% (139).

In a study that has been conducted, the drinks containing sucrose, maltose and maltodextrin were found to be more effective on plasma glucose levels by being absorbed 3.9% faster than placebo, but no effect on performance was found. In a study which has been conducted on the effects of amino acid drinks on fatigue, it was concluded that these drinks reduce muscle damage and fatigue, and maintain exercise performance only with respect to the consumption of liquid containing carbohydrates (140).

Since there is no standard for the content of sports drinks, it is very difficult to draw conclusions about its benefits and harms (139).

2.4.2.5.1.2. Sports Gels

Since the 1990s, sportsmen 's gels have become a developing sector in sports nutrition markets. Exogenous CHO uptake during exercise is appropriate in the form of 6-8% CHO solution. However, differences in body mass vary depending on sweat rates and ambient temperature. Thus, recent findings suggest that athletes who use athletic gels (especially isotonic in nature), which are suitable and practical forms of carbohydrate, together with the intake of electrolyte-containing fluids, maintain both their endurance performance simultaneously to hydration and their fuel during exercise. Athletes who do not prefer to drink in the provision of hydration can use them during the competitions and during long exercises (141,142).

2.4.2.5.1.3. Sports Bars

Athletes' drinks, gels and bars are often used by many athletes and active people as ergogenic helpers.At this point, it is important for athletes to read the label information of these products, to understand the content of the product and to have information about the uptake of the bars before, during and after the exercise (31).

The use of sports bars is practical. They are portable and easy to consume and are suitable for pre-match and recovery of carbohydrate, protein and micronutrient elements. They can be used especially in strength training where high energy requirements are in place. Energy and nutrients are important because they can be used in travels due to their content (141).

Persons prone to the emergence of reactive hypoglycemia or related symptoms may prefer carbohydrates with low glycemic index just prior to exercise or during warm-up, or avoid carbohydrate uptake 90 minutes prior to exercise. To prevent hypoglycemia, 15 g carbohydrates (sports drinks, gel or bar) are recommended just before exercise (143).

2.4.2.5.1.4. Multivitamin /Mineral Supplements

There is the risk of developing micronutrients for every soccer player due to metabolic anomalies, impaired digestion and absorption mechanism, excessive losses and inadequate nutrient intake (144). Mineral deficiency may impair athletic performance. If the player has a nutritional plan with adequate and balanced nutrient diversity, it is reported that there will be no deficiencies in micronutrients (145). Athletes usually consume higher doses of vitamins than daily necessity with improve their performance (2). For example, the use of supplements in athletes whose vitamin D deficiency is not diagnosed has no positive effect on performance (146).In some cases, the high level of a supplemented mineral may compete for absorption and reduce the absorption of other minerals (32).

Low iron uptake, low iron availability (increased cereal intake to meet increased carbohydrate requirement), hemolysis status (fragmentation of red blood cells due to severe bumping of feet on the ground), increased iron loss, vegetarian nutrition may cause iron deficiency (40). Athletes at risk should be informed about iron intake and utility of iron. At the same time, having regular checks on iron, and when required iron supplementation in physician control has great importance (95, 45). Multivitamin / mineral may be used in overseas camps or undernutrition (141). As a result, if a vitamin / mineral

supplement is required, it should be part of a total diet management plan and should be prescribed by a sports dietician or physician (135).

2.4.2.5.1.5. Sodium / Electrolyte Tablets

Electrolyte intake has an effect on exercise performance. Sodium and potassium, which are the main electrolytes (minerals) lost together with sweat, should be replenished for optimal performance and prevention of medical complications (32). Theya are recommended to consume daily on main meals andas snack foods, during exercise lasting 4 hours and after exercise (40).

2.4.2.5.1.6. Amino acids

Amino acids are organic elements composed of a carboxyl (COOH) and an amine (NH2) group attached to a radical (R) of various chemical structure (58). In nature there are 300 amino acids, 20 of which are involved in protein structure (147). Amino acids are the building blocks of proteins. The use of amino acids is widespread in order to stimulate the anabolic effect, increase weight loss and increase muscle density (11). Protein supplementation is recommended to improve dietary quality with considering personalized and metered conditions (68). Protein supplements and protein-containing meals have become popular in the early 90s and still maintain this popularity. Typically, these products include whey, casein and / or soy (148).

2.4.2.5.1.7. Whey Protein

Whey protein is an ergogenic support commonly known to increase muscle mass during exercise. Whey protein has long been popular amongst endurance athletes in terms of protein quality. It is a high quality protein source rich in essential amino acids that strengthens muscle protein synthesis (MPS) after exercise compared to other low quality protein sources (69). The typical whey protein concentrate contains 18 amino acids, representing almost the complete mixture. Alanine, arginine and aspartic acid are three common amino acids found in many whey proteins (149).

Whey proteins have higher concentrations tha the over all essential amino acids and various vegetable protein sources such as soy, corn and wheat gluten. In addition to having a full spectrum of amino acids, the amino acids found in whey are absorbed and used more effectively than the free amino acid solutions (150). Altough whey protein contains higher BCAA, it has higher bioavailability and solubility (151). 26 g whey protein contains 2.6 g

of leucine. These amounts have been determined as 1.5 g in the same amount of soy protein and 1.8 g in the same amount of casein (152).

Whey protein consumption is particularly appropriate for the use of energy and the anabolic phase of nutritional timing. It increases muscle protein synthesis rate to a higher level than casein protein after exercise (153). It is supported that whey protein has a positive effect on reaching maximum muscle mass and muscle strength level (154).

When whey protein is taken with creatine, its effect on maximal strength and lean body mass is more prominent. Whey protein is less useful when used alone (151).

In a study conducted on 24 Brazilian soccer players, the effect of hydrolyzed whey protein on body composition, performance and health parameters was searched. Individuals were divided into three groups as placebo group, hydrolyzed whey protein group and whey protein group. Significant decreases in the values of creatin kinase (CK) and lactate dehydrogenase (LDH) (30%) were observed which are muscle damage indication based on the placebo group of hydrolyzed whey protein. In the hydrolyzed whey protein group, compared to the other groups, the physical performance of the aerobic test showed that muscle damage decreased. These data indicate that hydrolyzed whey protein reduces muscle damage (155). In another study, 24 professional soccer players who were divided into three groups each day for 8 weeks were provided respectively with whey protein 1 g / kg / day, hydrolyzed whey pretini (1g / kg / day) and casein (1g / kg / day). While there was no significant change in physical performance in all 3 groups, it was seen that the muscle mass of the first two groups increased significantly compared to the third group. In a study that has been conducted, 25 g whey protein was given to one group at a time, while the same protein was given 10 times a day in 2.5 g. It has been reported that 25 g of whey protein intake at a time increases muscle protein synthesis and anabolic signal (156).

B-alanine found in the whey protein promotes the buffering mechanism by increasing the intramuscular carnosine level. Thus, the beginning of fatigue is delayed. The B-alanine contained in the whey protein improves recovery in repetitive acute movements such as sprint, sudden stop, acceleration and bounce. Anaerobic performance tests with different doses of b-alanine supplements are studied in soccer. The B-alanine found in the whey protein has been observed to improve fatigue time, sprint time and anaerobic performance (118).

In recent years, the use of whey protein has increased due to the studies indicating that it has antioxidant properties. It is thought that whey proteins have an effect on the conversion of cysteine amino acid to glutathione which is a strong antioxidant. Protein supplementation is recommended to improve dietary quality with personalized and reasonable conditions (68).

2.4.2.5.1.8. Branched Chain Amino Acids (BCAA)

BCAA (branched-chain aminoacids (1-leucine, 1-isoleucine, 1-valine) are amino acids that the body cannot synthesize and should be taken daily with nutrition (157).

BCAAs serve as precursors of glutamine and alanine which are used during rapid and intense exercise. During exercise, isoleucine and valine are used as direct energy sources (158). BCAA constitutes 1/3 of the muscle protein (159). BCAAs are oxidized in skeletal muscle, while other essential amino acids are primarily metabolized in the liver. BCAAs have been one of the subjects of high interest in sports science since 1980s (160). The most popular and effective ratio of additional support of BCAA is 4: 1: 1 leucine, isoleucine, valine (161).

BCAAs (especially leucine) stimulate protein synthesis and prevent the destruction of muscle cells. They also increase glucose intake and insulin sensitivity. In this way they can reduce the risk of diabetes. They increase the strength in endurance exercises. They can provide a sense of mental fatigue by preventing the taking of tryptophan into the brain (160). BCAAs delay the fatigue by providing serotonin production in the central nervous system (56). During exercise, isoleucine and valine are used as direct energy sources. BCAAs used during exercise are used by bodybuilding athletes and runners, considering their contribution to energy provision and also to recovery accelaration after exercise (158).

The use of BCAA has been reported to be more effective in the recovery period after intensive exercise. It has been reported that using BCAA after the exercise reduces muscle pain (162). A feeling of tiredness occurs due to a decrease in the amount of BCAA in the body as a result of sports activities. Tiredness can be delayed with BCAA support. At the same time, it was found that lean tissue mass increased by 1.5% in athletes with the use of BCAA-containing suplement. The loading of 2,6-5,6 grams twice a day has a positive effect on muscle mass increase and muscle regeneration (62). At the same time, in order to overcome exercise-induced muscle damage and muscle fatigue, two days before

and three days after the exercise, taking 3.2 g BCAA and 2.0 g taurine three times a day are seen as a successful support strategy (163). BCAA uptake containing ~ 2-3 g of leucine is recommended for muscle mass gain and recovery. In a studythat has been conducted, it was stated that daily intake of 1.25 g / kg BCAA for 12 months did not show toxic effects (41). For the individuals who make strength exercise, 20 minutes before and immediately after the exercise, BCAA given with a high dose (18g) has a significantly greater effect on muscle strength and muscle pain than BCAA given with a lower dose (6g) (164). However, many studies have been carried out to understand whether BCAAs' metabolism, participation in some specific biochemical muscle processes, and BCAA support will increase athlete performance. Most studies have failed to confirm this hypothesis (160).

2.4.2.5.1.9. Glutamine

Glutamine is the most abundant naturally occurring, nonessential amino acid in the human body. Glutamine is mainly synthesized, stored and released in skeletal muscle (165). It is also known to be stored in the lungs, brain and stomach (166). Glutamine is used at high rates by leukocytes (especially lymphocytes) to provide nucleotide biosynthesis, cell proliferation, acid-base balance, and support and maintain the functions of cells. Glutamine provides energy to muscles. In addition, glutamine has beneficial effects on intestinal function, morbidity, mortality and also immune cell function. Glutamine has also positive effects on healing after surgery and on maintaining muscle mass. In some catabolic cases such as trauma, prolonged fasting, sepsis and long-term physical exercise, glutamine deficiency may ocur (167). Glutamine is included in foods such as milk, egg, beef and fish meat, beans, parsley and spinach (166).

Glutamine use as ergogenic support is known in the art of clinical nutrition. Studies with a significant amount of glutamine supplementation in athletes have been reported to increase immune function or performance (168).

As the body enters the catabolic process during competition and training, this affects the blood glutamine level adversely. Glutamine stores are used to bring the blood glutamine level to the normal level. If the replenishment of glutamine stores is not achieved, overload syndrome and fatigue develop (148, 169). Even though the level gradually decreases during exercise, considering that the athlete applies a healthy diet, the glutamine level returns to normal level within 24 hours. However, the glutamine level of the athletes engaged in intensive exercise is chronically low. Given the relationship

between glutamine and immune system function, athletes with low glutamine levels are very vulnurable to upper respiratory tract infections. In a study which has been conducted on this subject, 73% of athletes who had infection were found to have glutamine levels below normal. Therefore, glutamine supplementation may be recommended to bodybuilders who are doing intensive strength training so that basal glutamine level can be increased or glutamine level decrease may be prevented with protein taken after exercise (158).

It is thought that the use of glutamine before exercise will both strengthen the immune system and suppress the production of pro-inflammation and decrease the effects of muscle damage (170). It has been emphasized that the use of acute glutamine 2 hours prior to the exercise prevented toxin leak by stabilizing the intestinal wall and caused an increase in peripheral heat shock response in the anti-inflammatory process. (171). It is stated that 0.3 g of glutamine intake at the beginning of the strength exercise will have a positive effect on the regeneration and recovery time of muscle strength (170). It was also found that the use of glutamine supplementation (6- 10 g) after exercise provided cell hydration, increased liver glycogen stores, and increased muscle mass and endurance. These studies have shown that a minimum of 2 grams of glutamine intake is sufficient to increase the level of plasma growth hormone, and 8 grams of glutamine has been shown to play a role in enhancing glycogen re-synthesis. It is also stated that glutamine needs to be included in the post-exercise meal because it promotes the role of the immune system and provides muscle regeneration after exercise.

Studies have shown that the consumption of short or long-term glutamine supplementation is reliable. It has been reported that glutamine intake up to 0.3 g / kg has no toxic effect (158, 172).

2.4.2.5.1.9.1. Glutamine Loading

Glutamine loading is regularly called glutamine intake during the day. The loading process is carried out twice a day in 500-1000 mg free amino acid form or before exercise (11). During 8 weeks of strength training, glutamine supplementation is said to improve performance (muscle strength) and positively affect body composition (body mass and lean mass increase and body fat reduction) (173).

2.4.2.5.1.10. Creatine

Creatine is one of the most researched and widely used ergogenic supports. In particular, it has been used by many professional or amateur athletes at various levels in recent years as an ergogenic support to improve training and competition performance. The fact that creatine is not included in the list of doping drugs by the International Doping Committee is another reason for its widespread use (174). Creatinine has also been recognized as a class A ergogenic support by international authorities (175). For professional athletes, it is observed that creatine supplementation is a safe and natural ergogenic support and performance increases when muscle creatine stores are high.

Creatine is stored in the skeletal muscles and liver in the body. Approximately 120 g creatine store is present in an average person, and approximately 2 grams a day endogenous or exogenous creatinine is needed at normal daily tempo. During the exercises the need to creatine increases (176).

2.4.2.5.1.10.1. The Role of Creatin in Soccer

Creatinine has potential effects such as protein synthesis, glycogen storage and improvement of thermoregulation (177). Creatine provides energy to the muscles as it helps to produce ATP. It is used to increase lean body mass, muscle strength, muscle creatine content and exercise performance by providing water holding in cell. Furthermore, during short and high-intensity exercises, it acts as a buffer against lactic acid and delays fatigue (178).

The most effective ergogenic support for increasing the high-intensity exercise capacity and muscle mass during exercise is creatine monohydrate (177). Creatine supplementation has been shown to improve performance in repeated training with high intensity, short-term activities or high intensity exercises with short rest periods such as jump, sprint and strength training (179). It has also been observed that creatinine intake increases body mass or muscle mass during exercise, delays fatigue and increases endurance (177).

In the study conducted to investigate the effects of acute creatine-monohydrate support on soccer-specific performance in young soccer players, dribbling times, vertical jumping heights and an increase in power test were observed. However, no effect was observed on endurance performance (180). In another study, it was reported that creatinine inhibited the increase of inflammatory markers (TNF-α and C-reactive protein) in response

to anaerobic exercise and reduced oxidative stress. It is stated that creatine supplementation is effective in maintaining muscle performance during the initial phase of strength training and in tolerating the increase in training intensity of athletes. In addition, creatine supplementation is indicated to prevent inflammation and muscle destruction after intense exercise (177).

2.4.2.5.1.10.2. Creatine Consumption in Soccer

It has been reported that following creatine supplementation protocols may cause an increase in the content of muscle creatine, in the lean body mass, in the performance of maximum strength, short lasting and high intensity exercise (13).

In study conducted byJoy et al. it was found that 1-2 g / day creatine nitrate supplementation is safe for 28 days. 5 days of creatine support, 20 g per day, increases the muscle stores by 20% (181). Some studies have found that creatine supplementation at doses less than 5 grams is absorbed faster and more effective than supplements over 10 grams (182,183). It has been reported that the combination of creatine (20 g / day for 5 days + 3 g / day for 9 days) and carbohydrate (6-12 g / kg / day) increases muscle strength in high-intensity and long lasting exercises (184). In another study, low-dose short-term oral CrMH supplementation (0.03 g/kg/day-14 days) shows that it has a beneficial effect on muscle strength output in young elite soccer players without any side effects (185). Creatine supplementation was found to have significant effect in less than 30 seconds (186). At the same time, creatine supplementation improves the performance of aerobic endurance exercises lasting more than 150 seconds (187).

Creatinine side effects include weight gain, dehydration, muscle cramps, kidney-liver damage, muscle injuries, gatrointestinal stress, and leg (anterior) compartment syndrome (188).

2.4.2.5.1.10.3. Creatine Loading

It is claimed that creatine loading creates an ergogenic effect by filling the intramuscular creatine and creatine phosphate stores. In many studies, it was found that short and long-term creatine loading increased strength, muscle strength, endurance and sprint performance (174). According to the protocol of creatine supplementation, during the loading period per body weight (15-20g/day) of 0.3g/kg in 5-7 days; during the maintenance period 0.03g / kg va (3-5 g/day) should be made within 20 days (177) .

2.4.2.5.1.11. Carnitine

L-carnitine (B-hydroxy-y-trimethylammonium butyrate) is an amino acid synthesized by the body. The two leading essential amino acids, lysine-methionine and cofactors (C, B_3, B_6 and Iron) can be synthesized by the body when present in sufficient amounts (189). Carnitine is responsible for translocating the long-chain fatty acids into the mitochondria for beta-oxidation and in the production of Acetyl-Coa. Thus it helps the carbohydrate flow through the krebs cycle (190). Naturally, there is 20-25 g of carnitine in the body. This amount varies from person to person. L-carnitine in the body has high energy requirements and is present in all organs and cells such as heart, muscle, immune system cells, brain, nerve cells and sperm. The amount of L-carnitine taken with nutrients varies from 60 to 200 mg Daily (189).

L-carnitine is one of the most common ergogenic 40 supports used for weight loss (178). Studies have shown that carnitine supplementation does not affect muscle carnitine content, fat metabolism, aerobic or anaerobic exercise performance, and weight loss in people who exercise and who has more than normal weight (191). In a study that has been conducted, it was found that carnitine supplementation (2 g/day) for 12 weeks increased plasma carnitine levels by 20% in meat-eating individuals and 30% in vegetarian individuals. However, muscle carnitine levels of meat-eating group are not affected. In vegans, it was observed that muscle carnitine level increased by 13%. Furthermore, It has been determined that it has no effect on muscle function and energy metabolism (192).

It was found that following the exercise l-carnitine intake decreased lactic acid production and increased the maximum oxygen consumption in some amounts.It has been suggested that this increase can be determinant in the results of important encounters (193). After providing 2 grams of carnitine per day for 2 weeks, it was stated that carnitine was effective on muscle pain and recovery after exercise (194).

In a study examining the effect of acute L-carnitine loading on the endurance performance of the soccer players, 3 g or 4 g L-carnitine taken before the exercise shows that it delayed fatigue (195).

2.4.2.5.1.12. Caffeine

Caffeine is included in the 2018 Monitoring Program and is not considered to be a Prohibited Substance (196). The metabolism of caffeine is influenced by various factors

such as gender, genetics, diet, physical activity, frequency of consumption and the use of certain drugs (197). Potential ergogenic effects of caffeine are associated with central nervous system stimulants, increased mobilization of fatty acids and maintenance of muscle glycogen stores (81). Furthermore, caffeine may affect the muscle contraction by facilitating the transport of calcium. It reduces fatigue as well as the plasma potassium accumulation associated with fatigue (11). However, it was observed that caffeine has no effect on increasing muscle strength. One of the reasons for the use of caffeine is to reduce the effort spent by increasing the stimulation and to achieve quick results in a short time (158). Caffeine has been shown to improve vigilance during continuous insomnia as well as exercise. Therefore, caffeine may increase vigilance during periods of continuous insomnia, as well as exercise periods that cause exhaustion (81).

Excessive consumption of caffeine can cause dehydration and diuresis. At the same time, permanent irritability, headache and anxiety may also be observed. Caffeine has potential side effects such as general toxicity, cardiovascular effects, calcium balance and its effect on bone, behavioral effects, genotoxic effects. Therefore, despite their ergogenic characteristics, athletes should be cautious when it comes to caffeine intake and consult experts on the effects of excessive caffeine intake on the health of the body (198).

It is stated that daily high caffeine intake (351 ± 139 mg / day) provides support to an equivalent performance as seen in daily low and moderate caffeine intake (199). The daily caffeine consumption in high amounts does not reduce the amount of caffeine taken before training. However, this amount can be said to cause sleeping problems (200). At the same time, the results of the studies show that moderate coffee consumption causes dehydration.

Carbohydrate is more useful when takeimingn with caffeine (substrate metabolism and ezercise performence with kafeine and karbonhidrate intake). Caffeine exerts a greater ergogenic effect when consumed in an anhydrous state as compared to coffee (81).

Caffeine should be consumed with caution in the evening before the competition, considering the effects on sleep (201). Caffeine intake before exercise increases the performance of both long and short intensive exercises (202). Caffeine intake at a dose of 3-6 mg / kg 30-60 minutes before the exercise or competition was demonstrated by studies that have a positive effect on performance and concentration. (143) When consumed at higher doses (≥ 9 mg/kg), it does not cause a further increase in performance. It was

observed that low caffeine doses in gum form (100 mg caffeine-containing chewing gum 5 minutes before exercise) increased performance (203).The scientific literature does not support any harmful changes in the liquid balance, which may adversely affect caffeine induced diuresis and performance during exercise. High doses of caffeine (≥ 9 mg / kg) may produce results that adversely affect performance development such as nausea, anxiety, insomnia and restlessness (81). In a study which has been conducted, it was reported that 6 mg / kg caffeine intake after 60 minutes of exercise significantly increased muscle function (204).

Caffeine supelemantation of 5.5 mg / kg provided to 20 male players 20 minutes prior to the exercise improved repetitive exercise capacity of athletes, decreased perceived difficulty. No change was observed in biochemical muscle damage parameters and immunological responses (205). Before the 90-minute intermittent shuttle running test, 15 mg / kg caffeine supplemented solution consumed by 15 male players developed sprint performance and active bouncing parameters. Caffeine has prevented fatigue-driven performance decline (206).

2.4.2.5.1.13. Antioxidants

Antioxidants are the most important weapon of the human body to eliminate oxidative stress which can be formed by free radicals. Antioxidants are man-made or natural substances that may prevent or delay some types of cell damage, remove free radicals and provide oxidant/antioxidant balance. Both endogenous and exogenous antioxidants are free radicals and act as scavengers. Therefore, they reduce the risk of disease by increasing the effect of the defense system (207, 208).

2.4.2.5.1.13.1. Classification of Antioxidants

2.4.2.5.1.13.1.1. Endogenous Oxidants

Endogenous antioxidants can be classified into two subgroups as enzymatic and nonenzymatic antioxidants (209, 210,211).

2.4.2.5.1.13.1.2. Exogenous Oxidants

Exogenous antioxidants are classified as vitamin exogenous antioxidants and exogenous antioxidants which are used as drugs. Nine physically active men were given 250 mg of vitamin E for 1 week and then exercised under hypoxic conditions (4200 m with elevation stimulator) for 60 minutes with 70% VO_2max. As a result, 250 mg vitamin E

supplementation for 1 week was found to decrease cell damage indicators after hypoxic exercise (212). In another study, the use of antioxidant supplements (vitamin C, vitamin E, β-carotene, selenium) were notsuggested against exercise-induced lipid peroxidation and inflammation, and it was suggested that the use of antioxidant supplements could delay muscle healing (213).

2.4.2.5.1.14. Omega-3

Omega-3 fatty acids cannot be synthesized in the body. It must be taken with nutrients since it is an essential fatty acid. Omega-3 is mostly found in seafood. They are rich in eicosapentaenoic acid (EPA, 20: 5n-3) and docosahexaenoic acid (DHA, 22: 6n-3) which are polyunsaturated fatty acids. Alpha-linolenic acid (ALA, 18: 3n-3) is plant-derived and found in flaxseed, soybean oil, hazelnut and walnut.

There are many benefits of omega-3 for athletes. It provides rapid recovery and reduces inflammation in tissues due to excessive exercise and muscle fatigue. A greater amount of somatotropin is released against normal stimuli (exercise, sleep, hunger). It shows such an anabolic effect and may increase muscle healing. It increases the distribution of nutrients and oxygen to tissues and improves aerobic metabolism due to better distribution of oxygen to the body (4).

Krill fat is a rich source of omega-3 fatty acids that can improve immune function after exercise (213). 1 gram per dose of krill fat supplementation was found to decrease the oxidative damage after exercise. However, it has no effect on antioxidant enzymes and serum lipid profile (214). It has been reported that 2 grams per day dose of krill fat supplementation provides an increase in IL-2 rate stimulating natural clays (NK) cell cytotoxic activity during the recovery process after exercise, but it does not affect the performance, duration and oxygen consumption (213).

2.4.2.5.1.15. Sodium Bicarbonate (Citrate)

Sodium bicarbonate is an alkali salt naturally present in the human body. Its main function is to assist in the control of excess acidity by buffering acids and is the main component of the alkaline in the blood. Therefore, sodium bicarbonate is also known as buffer salt. During high-intensity anaerobic exercise, sodium bicarbonate helps to buffer the lactic acid produced. However, fatigue is inevitable if the lactic acid production rate exceeds the required sodium bicarbonate capacity to buffer (4). It is stated that citrates can

cause gastrointesinal problems. Therefore, it is recommended to take the required dose with a large quantity of liquid (1-2 L).

A positive effect of 0.2 g / kg sodium bicarbonate supplementation given to 10 participants was found on fatigue. The use of sodium bicarbonate in soccer players (300 mg / kg bicarbonate or 500 mg / kg citrate 1-2 hours before the match) can increase the buffering capacity of the blood and increase performance in sports involving repeated sprints (141).

2.4.2.5.1.16. Coenzyme Q10

Coenzyme Q10, as a good antioxidant, participates in the electron and proton transport of the respiratory chain in the mitochondria inner membrane and reduces oxidative stress and prevents free radical oxidation in cells and tissues. Although antioxidants are produced in the body, their blood levels decrease with aging, lifestyle and environmental factors. Coenzyme Q10 increases the use of oxygen in the cell, in a way acts as the lung of the cell, provides the increase and consumption of the energy in the cell. It is abundantly present in each cell, especially in heart cells. It helps to carry out energy within the cell in the liver and helps to remove the liver-related fatigue. It protects different cell structures from free oxygen radicals produced during oxygen stress, such as intense physical exercise. Therefore, athletes tend to use antioxidant support to strengthen antioxidant defense in exercise and competition. However, it has recently been thought that free radicals may be functional in the body, particularly in signaling pathways associated with exercise stimulation. Free radical production can be a prerequisite for exercise effect in muscles (215). It was stated that the majority of daily average coenzyme Q10 intake was achieved by red meat (64%) (216).

It has been stated that oral CoQ_{10} intake in healthy individuals reduces the feeling of tiredness occured due to exercise and improves physical performance (217). It has shown that CoQ_{10} supplementation has no effect on anaerobic and aerobic performance after high density anaerobic exercise. However in an other study which was conducted the same year (218), In Finnish elite skiers, CoQ_{10} supplementation has been shown to improve aerobic and anaerobic capacity. It has been demonstrated that acute or chronic CoQ_{10} supplementation improves exercise performance in trained and non-trained people and increases muscle CoQ_{10} density but has no effect on muscle strength and anaerobic capacity (219). Different results are obtained that are not consistent on this subject.

2.4.2.5.1.17. Energy Drinks

Caffeine (essential active ingredient), other plant-based stimulants (guarana, yerba mate, etc.), glucronolactone (natural glucose metabolite), simple sugars (glucose, fructose etc), amino acids (taurine, carnitine, creatine etc.), plants (ginko biloba, ginseng, etc.), snake oil, and all of the energy drinks containing various vitamins are claimed to provide explosive energy. The maximum amount of caffeine content of energy drinks as a legal requirement in Turkey has been identified as 350mg/l of caffeine, 200mg/l of inositol, 2400 mg/l of glukronolakto, 400mg/l of taurine (220). It is reported that energy drinks provide mental vigilance, increase durability and energy, reduce fatigue, accelerate metabolism and improve performance in general (221).

It should be kept in mind that high levels of caffeine intake can lead to more serious health problems in people sensitive to caffein and in people with cardiovascular problems such as hypertension, heart failure and arrhythmia (222,223). It is not recommended to consume more than 500 mL of energy drinks per day (224).

2.4.2.5.1.18. Conjugated Linoleic Acids (CLA)

Conjugated linoleic acid (CLA) is isomers formed by the coupling of two double bonds of 18 carbons with polyunsaturated linoleic acid by methylene bond. Its main sources are red meat, milk and milk products. Depending on the feeding conditions, each gram of meat contains between 1.2 and 12.5 mg of conjugated linoleic acid (CLA) (224).

Regular intake of CLA inhibits lipoprotein-lipase enzyme to help store fats in the body and therefore reduces the amount of fat stored in the body. It also releases previously stored fats to return to the blood stream. Fats that return to the blood stream use the muscles as a source of energy.

In a study that has been conducted, mice feeding with a diet plan containing 0.5% CLA showed that there is a 60% decrease in their body fat and a 14% increase in their lean body masses compared to control mice (225). Thom et al (2001) concluded that CLA also reduced body fat in healthy people exercising. (226).

2.4.2.5.1.19.Pollens

Pollens are the bioactive structures that flowering plants form in order to breed. Pollen is used for feeding bees, classification of honey and for treatment in health field. [227]. Pollens have been reported to contain components such as protein, carbohydrate, lipid, enzymes, vitamins, amino acids as well as bioactive components with hormon

property such as adrenaline and noradrenaline (228). Furthermore, biotin, lactic acid, glutamic acid, growth hormones, enzymes, pigments and various flavonoids are present in different ratios depending on the flora field where the pollen is collected (229).

2.5. Weight Control in Soccer

In case of high energy intake, excess energy is stored as fat in the body and a very small portion is stored as glycogen (24).

Because soccer is a sport that must be covered long distance during the competition/exercise, in order to improve the speed and agility parameters, the lean body mass must be high and the fat mass should be low. Thus gravity does not create a negative effect on the movements in soccer such as jumping and bouncing (Figure 2.4) (118).

Type of Sports	Ideal Fat Percentage	
	Male	Female
Basketball	7-9	7-11
Sprint	6-10	7-11
Marathon	5-7	5-9
Gymnastics	5-7	5-10
Swimming	6-10	6-12
Volleyball	7-9	7-11
Wrestling	5-7	-
Soccer	6-8	8-10

Figure 2.4. Recommended Body Fat Percentage

When an athlete whose body weight is within the recommended limits is compared to an athlete whose body weight is above normal, it is seen that the first athlete needs less energy and spends less on the reserve force in return for the same exercise (11).

2.6. Performance Improvement Strategies in Soccer Players

Genetic structure of the individual, physiological and psychological factors, health, exercise status, exercise time, intensity of exercise, environmental factors and nutrition play a role in the increase of performance. Sufficient and balanced nutrition can provide a high level of effectiveness in training. (70). Food selection before and after exercise,

sufficient energy and liquid intake, balanced distribution of nutrients and carbohydrate consumption are factors that determine performance in terms of nutrition (138). Adequate protein intake can provide optimum performance. When the energy of the diets with high protein content is high, it may affect the health and performance of the individuals negatively with the weight gain. The type of protein taken and the balance, timing and amount of amino acids are important for increasing performance. Hormones play an important role in ensuring exercise performance. After exercise, protein intake in the shortest possible time affects the performance positively by utilizing the hormonal environment (growth hormone and testosterone) and the blood flow increased by the completed exercise (230).

3. MATERIALS AND METHODS

3.1. Type of Research

It is a descriptive and cross-sectional study. This is a survey study which uses human research as basis and does not require laboratory.

3.2. Time of Study and Sample Selection

This research was conducted between February-May 2019. The population of all male footballers of Turkey Football Federation in 2018-2019 season who are not foreign national is 5946. Considering each league; there are 242 soccer players in the Super League, 357 in TFF 1st League, 955 in 2nd League, 1332 in 3rd League and 3060 in Regional Amateur League. The sample of the study was formed by using the weighting method and selecting randomly a total of 380 male players, 20 from the Super League, 40 from the TFF 1st League, 60 from the 2nd League, 80 from the 3rd League and 180 from the Regional Amateur League. The Informed Consent Form has been signed by the soccer players within the sample who voluntarily participated in the research. For this research, the Ethics Committee approval was obtained by the Research Ethics Committee of Yeditepe University with the decision number 16/26 dated 13/02/2019 as the research project number 962.

3.3.Data Collection and Evaluation

Data were collected by using questionnarie method. The questionnaries were distributed and collected by calling or directly meeting face to face. The research data composed of 3 parts which are Questionnaire Form, Nutritional Ergogenic Supplement Consumption Frequency Form (The Food Consumption Frequency Form (FFQ) format remained the same. Nutritional ergogenic supplements were added instead of nutrients in the form) and 24 Hour Nutrient Consumption Record Form (Food reminder method used). was completed by the athletes. There are 42 questions in the the questionnaire form which is the first part. Questions regarding socio-demographic characteristics of soccer players, nutritional status, use of ergogenic nutrition, purpose of use, awareness and awareness levels were asked. In the second part, 24-hour food consumption records were taken. Daily food consumption records of the participants were analyzed via "Computer Aided Nutrition Progamme'' which was developed for Turkey and Nutrition Information Systems 38 Packaged Software (BEBIS). The average daily energy and nutrient intake of athletes was evaluated separately. Calculated energy and nutrients data was evaluated based on the

recommended Dietary Reference Intake Level depending on the age and gender. For 18 ergogenic products; information, status of use, frequency of use (frequency in days, weeks or months and amount consumed) and amount of use were questioned in the Frequency of Ergogenic Food Consumption Form which is the third part. The questionnaire to be used in this study is given in form.

3.4. Statistical Evaluation of Data

In the consumption frequency analysis, a score of 1 to 10 was formed by coding 10 for everyday and 1 for never.

The data were first grouped and then necessary coding was done. The normality test was done with Shapiro-Wilk test. Non-parametric statistical methods were used for values with skewed (nonnormally distributed, Shapiro-Wilk $p>0.05$) distribution.

Descriptive statistics were presented using mean and standard deviation, median (and minimum-maximum) for the non-normally distributed variables.

Non-parametric statistical methods were used for values with skewed distribution. For comparison of two non-normally distributed independent groups Mann Whitney U test was used.

For comparison of more than two non-normally distributed independent groups Kruskal Wallis test was used. For significant results, the difference between pairwise groups were evaluated by Mann-Whitney U test. Statistical significance level was calculated by using Bonferroni correction. To get the Bonferroni corrected/adjusted p value, divide the original α-value by the number of analyses on the dependent variable.

The Fisher's Exact test was used for categorical variables and expressed as observation counts (and percentages). Statistical significance was accepted when two-sided p value was lower than 0.05.

Statistical analysis was performed using the SPSS Statistical Software version 25.0 and 24-hour Food Consumption Records Form was analyzed via "Computer Aided Nutrition Progamme, Nutrition Information System (BEBIS) which was developed for Turkey.

4. RESULTS

The research group has been composed of a total of 380 male Turkish Federation League soccer players of which 20 players from Super League, 40 players from the 1 st League, 60 players from the 2 nd League, 80 players from the 3 rd League and 180 players from the Regional Amateur League.

Table 4. 1. Demographic Characteristics of Soccer Players

		n	%
Martial Status	**Married**	92	24,2
	Single	288	75,8
Education	**Primary**	20	5,3
	Secondary	296	77,9
	Graduate	64	16,8
League	**Amateur**	180	47,4
	Professional	200	52,6
Which League?	**Super League**	20	5,3
	Tff 1st League	40	10,5
	2nd League	60	15,8
	3rd League	80	21,1
	Amateur League	180	47,4
Position	**Goalkeeper**	44	11,6
	Defense	86	22,6
	Midfield	197	51,8
	Stiker	53	13,9

Table 4. 2. Distribution of Demographic Characteristics of Soccer Players Depending on the League.

		Super League		**Tff 1st League**		**2nd League**		**3rd League**		**Amateur League**		**p**
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**N**	**%**	
Martial Status	**Married**	8	40,0	17	42,5	27	45,0	27	33,8	13	7,2	**<0,001**
	Single	12	60,0	23	57,5	33	55,0	53	66,3	167	92,8	
Education	**Primary**	0	0,0	0	0,0	6	10,0	3	3,8	11	6,1	
	Secondary	8	40,0	32	80,0	48	80,0	66	82,5	142	78,9	**<0,001**
	Graduate	12	60,0	8	20,0	6	10,0	11	13,8	27	15,0	
Position	**Goalkeeper**	4	20,0	6	15,0	8	13,3	12	15,0	14	7,8	
	Defense	5	25,0	7	17,5	13	21,7	16	20,0	45	25,0	0,450
	Midfield	9	45,0	24	60,0	34	56,7	37	46,3	93	51,7	

	Stiker	2	10,0	3	7,5	5	8,3	15	18,8	28	15,6	

Fisher's Exact test

There is statistically significant difference between Leagues and martial status, education (p<0,05). The proportion of singles in the amateur league was higher than the others. While the ratio of graduates in the super league is high, the proportion of the secondary school in the amateur league is high.

Table 4. 3. Anthropometric Measurements and Training Characteristics of Soccer Players

	Mean ±SD Med.(Min-Max)
Age	24±5 23 (18-38)
Height	179±7 180 (160-198)
Weight	75±7 75 (60-96)
How many days a week do you train?	4,18±1,58 5 (1-7)
How many hours a day do you usually train?	1,52±0,42 1,5 (1-2,5)

Table 4. 4. Distribution of Anthropometric Measurements and Demographic Characteristics of Soccer Players Depending on the League

	Super League	**Tff 1st League**	**2nd League**	**3rd League**	**Amateur League**	**p[1]**
	Mean ±SD Med.(Min-Max)	**Mean ±SD Med.(Min-Max)**	**Mean ±SD Med.(Min-Max)**	**Mean ±SD Med.(Min-Max)**	**Mean ±SD Med.(Min-Max)**	
Age	28±5 29 (20-37)	26±5 26 (18-38)	25±4 26 (18-34)	25±5 24 (18-37)	22±3 22 (18-33)	**<0,001**
Height	183±6 183 (174-198)	182±6 183 (168-194)	181±6 181 (165-192)	180±6 180 (168-191)	177±7 178 (160-196)	**<0,001**
Weight	76±5 76 (68-86)	78±6 79 (64-89)	77±7 78 (62-96)	78±5 78 (67-90)	73±7 72 (60-94)	**<0,001**
BMI	22,84±0,71 22,74(21,68-24,25)	23,39±1,26 23,39(19,93-26,47)	23,75±1,59 23,65(20,02-27,45	24,05±1,08 24,08(21,80-26,78)	23,32±2,09 23,06(17,92-29,34	**<0,001**
How many days a week do	3,75±0,97 4 (2-6)	5,93±0,57 6 (5-7)	5,48±0,62 6 (4-6)	5,35±0,66 5 (4-6)	2,89±1,13 3 (1-7)	**<0,001**

you train?						
How many hours a day do you usually train?	1,5±0,4 1,5 (1-2)	1,69±0,28 1,5 (1-2)	1,56±0,4 1,5 (1-2)	1,56±0,39 1,5 (1-2)	1,44±0,45 1,5 (1-2,5)	**<0,004**

[1]Kruskal Wallis test

There is statistically significant difference between Leagues and Age, Height, Weight, BMI, Training days, Training hours (Kruskal Wallis p<0,05).

Table 4. 5. Comparison of Anthropometric Measurements and Demographic Characteristics of Soccer Players Depending on the League

Post-Hoc Pairwise Comparisons						
p[2]	**Age**	**Height**	**Weight**	**BMI**	**Training days**	**Training hours**
Super league vs. TFF 1stleague	0,211	0,956	0,375	0,047	**<0,005**	0,063
Super league vs. 2nd league	0,083	0,311	0,401	0,006	**<0,005**	0,563
Super league vs. 3rd league	0,038	0,174	0,237	**<0,001**	**<0,005**	0,520
Super league vs. Amateur league	**<0,005**	**0,001**	0,015	0,521	**<0,005**	0,483
TFF 1st league vs. 2nd league	0,659	0,207	0,907	0,309	**0,001**	0,119
TFF 1st league vs. 3rd league	0,194	0,077	0,960	0,009	**<0,005**	0,105

TFF 1st league vs. Amateur league	**<0,005**	**<0,005**	**<0,005**	0,294	**<0,005**	**<0,005**
2nd league vs. 3rd league	0,360	0,632	0,943	0,103	0,222	0,964
2nd league vs. Amateur league	**<0,005**	**0,001**	**<0,005**	0,031	**<0,005**	0,055
3rd league vs. Amateur league	**<0,005**	**0,002**	**<0,005**	**<0,001**	**<0,005**	0,026

[2]Mann-Whitney U test

According to post-hoc pairwise comparisons, There is significant difference between all pairwise comparisons except 2nd league and 3rd league in terms of training days.

There is significant difference between Super league and Amateur league in terms of Age, Height, Weight, Training days and also significant difference was found between TFF 1st league and Amateur league in terms of Age, Height, Weight, Training days, Training hours. Moreover, it could be seen that Age, Height, Weight, Training days were differ in between 2nd league and Amateur league, 3rd league and Amateur league (Mann-Whitney U $p<0,005$).

There is significant difference between Super league and 3rd league in terms of BMI. Morever, it could be seen that BMI was differ in between 3rd league and Amateur legue.

Table 4. 5. The Answers Given by Soccer Players to the Questions "Choice of Nutrition Information Sources of Soccer Players", "Being a Dietitian in the Club", "Relationship Between Nutrition and Success in Sports"

		n	**%**
Who prepares your nutrition program?	**Coach**	74	38,3
	Club Doctor	31	16,1

	Nutritionist	34	17,6
	Friends And Environment	26	13,5
	Written and Visual Media	12	6,2
	Book etc.	16	8,3
Does your club have a dietitian?	**Yes**	56	14,7
	No	324	85,3
What do you think is the relationship between nutrition and success?	**No relationship**	11	2,9
	Very close relationship	306	80,5
	No information	63	16,6

Table 4. 6. Distribution of Nutrition Status Questions Depending on the League.

		Super League		**Tff 1st League**		**2nd League**		**3rd League**		**Amateur League**		**p**
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Do you think you are eating enough and balanced?	**Yes**	17	85,0	29	72,5	44	73,3	36	45,0	90	50,0	**<0,001**
	No	0	0,0	3	7,5	3	5,0	24	30,0	41	22,8	
	Sometimes	3	15,0	8	20,0	13	21,7	20	25,0	49	27,2	
Do you do your nutrition within a program?	**Yes**	9	45,0	18	45,0	22	36,7	50	62,5	94	52,2	**0,037**
	No	11	55,0	22	55,0	38	63,3	30	37,5	86	47,8	
Who prepares your nutrition program?	**Coach**	0	0,0	4	22,2	9	40,9	25	50,0	36	38,3	-
	Club Doctor	0	0,0	0	0,0	5	22,7	12	24,0	14	14,9	
	Nutritionist	9	100,0	5	27,8	4	18,2	4	8,0	12	12,8	
	Friends And Environment	0	0,0	2	11,1	2	9,1	5	10,0	17	18,1	
	Written and Visual Media	0	0,0	3	16,7	2	9,1	1	2,0	6	6,4	
	Book etc.	0	0,0	4	22,2	0	0,0	3	6,0	9	9,6	
Does your club have a dietitian?	**Yes**	20	100,0	19	47,5	4	6,7	6	7,5	7	3,9	**<0,001**
	No	0	0,0	21	52,5	56	93,3	74	92,5	173	96,1	
Do you think	**Yes**	19	95,0	36	90,0	53	88,3	55	68,8	118	65,6	**<0,001**

that the nutritional habits changed after starting the active sport?	**No**	1	5,0	4	10,0	7	11,7	25	31,3	62	34,4	
What do you think is the relationship between nutrition and success?	**No relationship**	0	0,0	0	0,0	0	0,0	1	1,3	10	5,6	-
	Very close relationship	19	95,0	35	87,5	60	100,0	59	73,8	133	73,9	
	No information	1	5,0	5	12,5	0	0,0	20	25,0	37	20,6	
Do you have a habit of skipping meals?	**Yes**	0	0,0	6	15,0	8	13,3	9	11,3	43	23,9	**<0,001**
	Sometimes	7	35,0	22	55,0	36	60,0	54	67,5	107	59,4	
	No	13	65,0	12	30,0	16	26,7	17	21,3	30	16,7	
Your answer is yes or sometimes what is the reason you skip meals?	**No time**	4	57,1	8	28,6	7	15,9	24	38,1	58	38,7	-
	Too much	0	0,0	9	32,1	12	27,3	19	30,2	35	23,3	
	Be choosy in eating	1	14,3	9	32,1	10	22,7	11	17,5	16	10,7	
	Being anorexic	1	14,3	0	0,0	10	22,7	5	7,9	18	12,0	
	I want to lose weight	0	0,0	0	0,0	5	11,4	4	6,3	17	11,3	
	Others	1	14,3	2	7,1	0	0,0	0	0,0	6	4,0	

Fisher's Exact test

There is statistically significant difference between Leagues in terms of these questions written below:

Do you think you are eating enough and balanced?

Do you do your nutrition within a program?,

Does your club have a dietitian?

Do you think that the nutritional habits changed after starting the active sport?

Do you have a habit of skipping meals? ($p<0,05$).

The ratio of balanced and sufficiently fed is higher in the super league. The ratio of those who make their nutrition according to the program is higher in 3rd league. The rate of dietitians in super league clubs is high. The rate of who change nutritional habits after

starting the active sport is higher Super league than others. 3rd League players sometimes skip meals and this ratio is significant.

Table 4. 7. Soccer Player's Main Meals and Snacks Regularly in the Following Time Intervals.

		n	%
Breakfast	**Yes**	303	79,7
	No	77	20,3
Mid-morning	**Yes**	144	37,9
	No	236	62,1
Noon	**Yes**	321	84,5
	No	59	15,5
Afternoon	**Yes**	197	51,8
	No	183	48,2
Evening	**Yes**	340	89,5
	No	40	10,5
Night	**Yes**	156	41,1
	No	224	58,9

Table 4. 8. Soccer Player's Main Meals and Snacks Regularly in the Following Time Intervals Depending on the League.

		Super League		**Tff 1st League**		**2nd League**		**3rd League**		**Amateur League**		**p**
		n	**%**	**N**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Breakfast	**Yes**	16	80,0	33	82,5	45	75,0	65	81,3	144	80,0	0,887
	No	4	20,0	7	17,5	15	25,0	15	18,8	36	20,0	
Mid-morning	**Yes**	15	75,0	6	15,0	14	23,3	25	31,3	84	46,7	**<0,001**
	No	5	25,0	34	85,0	46	76,7	55	68,8	96	53,3	
Noon	**Yes**	19	95,0	38	95,0	58	96,7	69	86,3	137	76,1	**<0,001**
	No	1	5,0	2	5,0	2	3,3	11	13,8	43	23,9	
Afternoon	**Yes**	15	75,0	23	57,5	39	65,0	38	47,5	82	45,6	**0,014**
	No	5	25,0	17	42,5	21	35,0	42	52,5	98	54,4	
Evening	**Yes**	20	100,0	40	100,0	58	96,7	72	90,0	150	83,3	**<0,001**
	No	0	0,0	0	0,0	2	3,3	8	10,0	30	16,7	
Night	**Yes**	8	40,0	20	50,0	25	41,7	28	35,0	75	41,7	0,630
	No	12	60,0	20	50,0	35	58,3	52	65,0	105	58,3	

Fisher's Exact test

There is statistically significant difference between Leagues in terms of these meals: Mid-morning, noon, afternoon, evening (p<0,05). These meals have the highest rate in Super League. Evening is higher in both of super league and Tff 1st League than the others.

Table 4. 9. Distribution of Morning Breakfast Nutritional Preference and Daily Water Consumption Status Depending on the League.

		Super League		Tff 1st League		2nd League		3rd League		Amateur League		p
		n	%	n	%	n	%	n	%	n	%	
What kind of foods do you usually prefer at breakfast?	**Tea, Cheese, Eggs etc.**	15	75,0	37	92,5	58	96,7	64	80,0	131	72,8	-
	Tea, Pastry, Toast, Bagels etc.	2	10,0	0	0,0	2	3,3	12	15,0	34	18,9	
	Drinks Only (Tea, Coffee, Etc.)	0	0,0	0	0,0	0	0,0	4	5,0	10	5,6	
	Cereal Flakes With Milk	3	15,0	2	5,0	0	0,0	0	0,0	5	2,8	
	Others	0	0,0	1	2,5	0	0,0	0	0,0	0	0,0	
How many liters of water do you drink per day?	**0,5-1 liter**	0	0,0	6	15,0	1	1,7	1	1,3	10	5,6	**<0,021**
	1-2 liter	3	15,0	13	32,5	18	30,0	28	35,0	65	36,1	
	2-4 liter	15	75,0	21	52,5	39	65,0	50	62,5	98	54,4	
	5 liter and above	2	10,0	0	0,0	2	3,3	1	1,3	7	3,9	

Fisher's Exact test

There is statistically significant difference between Leagues and liters of water that players dring per day (p<0,05). Super league players drink 2-4 liter water per day more than other leagues.

Table 4. 10. Distribution of Alcohol and Smoking Consumption of Soccer Players' Depending on the League

		Super League		Tff 1st League		2nd League		3rd League		Amateur League		p
		n	%	n	%	n	%	n	%	n	%	

Do you drink alcohol?	**Yes**	0	0,0	7	17,5	7	11,7	4	5,0	12	6,7	0,055
	No	20	100,0	33	82,5	53	88,3	76	95,0	168	93,3	
Do you smoke?	**Yes**	0	0,0	5	12,5	3	5,0	5	6,3	23	12,8	0,127

Table 4. 11. Distribution of Soccer players' Status and Their Responses to Training and Match Days Depending on the League

		Super League		**Tff 1st League**		**2nd League**		**3rd League**		**Amateur League**		**p**
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Do you apply a diet different from the normal days on your training / match days?	**Yes**	2	10,0	22	55,0	37	61,7	47	58,8	86	47,8	**<0,001**
	No	18	90,0	18	45,0	23	38,3	33	41,3	94	52,2	
How many hours do you consume the last meal before the training / match?	**1-2 Hours Before**	19	95,0	14	35,0	18	30,0	49	61,3	114	63,3	**<0,001**
	3-4 Hours Before	1	5,0	26	65,0	42	70,0	31	38,8	66	36,7	

Fisher's Exact test

There is statistically significant difference between Leagues in terms of these questions: Do you apply a diet different from the normal days on your training / match days?, How many hours do you consume the last meal before the training / match?.
Super League players do not apply diet different from the normal days on your training / match day and they consume the last meal 1-2 hours before the match.

Table 4. 12. Practices of Soccer Players Before, During and After Training/Competition

		n	**%**
What kind of practices do you do in your training or pre-match diet?	**No changes**	126	33,2
	Protein-Weighted Nutrition (Meat, Milk, Yogurt, ...)	145	38,2

	Carbohydrate-Weighted Nutrition (Bread, Cereal, Dough Foods, Sugary Foods, ...)	30	7,9
	Oil-Weighted Nutrition (Roasting, ...)	4	1,1
	Protein + Carbohydrate Weighted Nutrition	75	19,7
Which beverages do you meet with more liquid during training or match?	**Water**	287	75,5
	Coke	13	3,4
	Juice	14	3,7
	Protein Powder	4	1,1
	Mineral water	14	3,7
	Salted Ayran	3	0,8
	Sports Drink	45	11,8
	Other	0	0,0
	Tea, Coffee	19	5,0
	Other	8	2,1
Which of the following is the most common practice in your diet or after-match diet?	**Meal Time Waiting for what food is available**	98	25,8
	Drink plenty of water	153	40,3
	Drink Fruit Juice	26	6,8
	I eat fruit	24	6,3
	Include Sports Drink	7	1,8
	Consuming Carbohydrate-rich foods	72	18,9

Table 4. 13. Distribution of Applications of Soccer Players Before, During and After Match /Competition

		Super League		**Tff 1st League**		**2nd League**		**3rd League**		**Amateur League**		**p**
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
What kind of practices do you do	**No changes**	4	20,0	6	15,0	14	23,3	25	31,3	77	42,8	-
	Protein-Weighted Nutrition (Meat, Milk, Yogurt, ...)	1	5,0	16	40,0	31	51,7	34	42,5	63	35,0	

in your training or pre-match diet?	**Carbohydrate-Weighted Nutrition (Bread, Cereal, Dough Foods, Sugary Foods, ...)**	3	15,0	1	2,5	4	6,7	6	7,5	16	8,9	
	Oil-Weighted Nutrition (Roasting, ...)	0	0,0	0	0,0	0	0,0	0	0,0	4	2,2	
	Protein + Carbohydrate Weighted Nutrition	12	60,0	17	42,5	11	18,3	15	18,8	20	11,1	
Which beverages do you meet with more liquid during training or match?	**Water**	9	45,0	34	85,0	46	76,7	60	75,0	138	76,7	-
	Coke	0	0,0	0	0,0	0	0,0	4	5,0	9	5,0	
	Juice	0	0,0	0	0,0	0	0,0	5	6,3	9	5,0	
	Protein Powder	0	0,0	0	0,0	2	3,3	1	1,3	1	0,6	
	Mineral water	2	10,0	0	0,0	6	10,0	5	6,3	1	0,6	
	Salted Ayran	0	0,0	0	0,0	0	0,0	0	0,0	3	1,7	
	Sports Drink	9	45,0	6	15,0	6	10,0	5	6,3	19	10,6	
	Other	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	
Which of the following is the most common practice in your training and at the time of the match or between your circuit?	**I Don't Eat and Don't Drink**	5	25,0	1	2,5	2	3,3	9	11,3	48	26,7	-
	Drink plenty of water	10	50,0	21	52,5	33	55,0	42	52,5	77	42,8	
	Drink Fruit Juice	0	0,0	0	0,0	2	3,3	3	3,8	11	6,1	
	Include Lemonade	0	0,0	0	0,0	2	3,3	7	8,8	5	2,8	
	Sports Bar Consumption	1	5,0	0	0,0	0	0,0	4	5,0	7	3,9	
	Consuming Sports Gel	0	0,0	6	15,0	0	0,0	0	0,0	0	0,0	
	Coke, I'm in the Can	0	0,0	0	0,0	1	1,7	0	0,0	1	0,6	
	Include Energy Drink	0	0,0	5	12,5	5	8,3	3	3,8	7	3,9	

	Include Sports Drink	3	15,0	5	12,5	8	13,3	5	6,3	14	7,8	
	Tea, Coffee	0	0,0	1	2,5	5	8,3	6	7,5	7	3,9	
	Other	1	5,0	1	2,5	2	3,3	1	1,3	3	1,7	
How many hours after a practice / game do you eat?	**0-1 Hour**	14	70,0	23	57,5	35	58,3	56	70,0	110	61,1	0,490
	2-3 Hour	6	30,0	17	42,5	25	41,7	24	30,0	70	38,9	
Which of the following is the most common practice in your diet or after-match diet?	**Meal Time Waiting for what food is available**	7	35,0	14	35,0	22	36,7	16	20,0	39	21,7	-
	Drink plenty of water	2	10,0	9	22,5	18	30,0	37	46,3	87	48,3	
	Drink Fruit Juice	0	0,0	0	0,0	2	3,3	7	8,8	17	9,4	
	I eat fruit	1	5,0	2	5,0	0	0,0	6	7,5	15	8,3	
	Include Sports Drink	1	5,0	0	0,0	2	3,3	1	1,3	3	1,7	
	Consuming Carbohydrate-rich foods	9	45,0	15	37,5	16	26,7	13	16,3	19	10,6	

Table 4. 14. Daily Energy and Nutrient Consumption Values of Soccer Players

	Mean ±SD **Med.(Min-Max)**
Energy (kcal)	2213,85±545,83 2177,62 (842,46-4053,87)
Carbohydrate (g)	237,56±65,43 237,67 (80,42-436,69)
Carbohydrate (TE%)	44,51±8,26 45 (16-63)
Protein (g)	102,65±38,42 99,81 (15,34-198,84)
Protein (TE%)	18,75±5,09 18 (7-35)
Plant based protein (g)	35,43±12,47 33,73 (10,26-84,75)
Fat (g)	92,24±32,15 87,58 (30,72-208,12)

Fat (TE%)	36,76±6,76 36 (21-59)
Saturated Fatty Acid (g)	32,13±12,16 32,43 (3,97-67,19)
Polyunsaturated Fatty Acid (g)	22,06±10,59 20,86 (3,05-60,95)
Monounsaturated Fatty Acid (g)	30,95±14,23 28,62 (6,97-93,44)
Cholesterol (mg)	455,67±259,29 447,45 (29-1191,75)
Fiber (g)	24,38±10,8 22,08 (5,92-72,42)
VITAMINS	
Vitamin A (µg/RE)	1161,77±1551,6 952,1 (126,3-23566,1)
Vitamin E (mg)	21,62±10,07 20,47 (2,27-53,09)
Vitamin B_1 (mg)	0,96±0,35 0,93 (0,16-2,58)
Vitamin B_2 (mg)	1,56±0,55 1,54 (0,19-6,05)
Niacin (mg)	17,06±9,64 14,82 (1,39-57,22)
Total Folic Acid (mcg)	339,19±121,41 330,4 (61,58-1005,46)
Vitamin B_{12} (mcg)	5,73±5,9 5,1 (0-89,75)
Vitamin C (mg)	113,65±97,26 93,19 (0,42-644,96)
Vitamin B_6 (mg)	1,6±0,63 1,5 (0,2-3,74)
MINERALS	
Potassium (mg)	2655,18±1031,3 2639,44 (257,36-5753,53)
Calcium (mg)	722,91±301,52 685,45 (75,2-1887,85)
Magnesium (mg)	299,65±122,99 286,2 (37,3-740,24)
Phosphorus (mg)	1446,05±499,14 1393,73 (212,26-3542,4)
Iron (mg)	13,34±4,33 13,12 (2,83-27,03)
Zinc (mg)	13,23±4,91 13 (2,21-28,51)

TE: Total Energy

Table 4. 15. Distribution of Daily Energy and Macro Nutrient Consumption Values of Soccer Players Depending on the League

	Super League	**Tff 1st League**	**2nd League**	**3rd League**	**Amateur League**	**p**
	Mean ±SD Med. (Min-Max)	**Mean ±SD Med. (Min-Max)**	**Mean ±SD Med. (Min-Max)**	**Mean ±SD Med. (Min-Max)**	**Mean ±SD Med. (Min-Max)**	
Energy (kcal)	2096,45±540,83 1991,79- (1532,5-4053,87)	2489,99±548,01 2493,53- (1416,97-3337,44)	2449,13±480,21 2290,51- (1443,16-3533,9)	2171,03±535,3 2173,59- (842,46-3533,9)	2053,58±512,23 2035,38- (842,46-3502,4)	**<0,001**
Carbohydrate (g)	206,85±69,2 192,07 (129,35-436,69)	235,49±73,43 246,68 (80,42-361,94)	241,89±70,45 242,17 (120,25-433,1)	240,5±63,37 239,11 (117,05-433,1)	239,49±60,43 239,11 (117,05-357,06)	0,138
Carbohydrate (TE%)	40,79±9,19 41 (20-63)	38,9±8,86 39,5 (16-56)	40,49±8,75 42 (25-58)	45,91±7,52 47 (25-59)	48,16±5,72 49 (36-59)	**<0,001**
Protein (g)	107,5±26,2 104,87 (65,52-162,53)	137,96±31,86 135,14 (73,88-197,58)	128,68±33,46 125,98 (55,94-198,84)	94,97±36,08 92,58 (15,34-181,3)	81,79±29,91 81,46 (15,34-150,15)	**<0,001**
Protein (TE%)	21,37±4,3 21 (16-30)	23,25±4,97 23,5 (14-35)	21,57±4,27 21 (16-32)	17,59±4,5 17 (7-31)	16,09±4,04 16 (7-28)	**<0,001**
Plant based protein (g)	37,87±14,15 33,73- (22,69-76,84)	36,96±13,96 35,22- (10,26-71,98)	39,54±15,14 36,72- (19,17-84,75)	35,02±12,09 33,34- (13,49-84,75)	32,74±9,78 32,59- (13,49-67,95)	0,193
Fat (g)	90,39±35,8 85,13 (42,68-174,69)	106,99±36,27 101,18 (46,7-208,12)	105,22±35,14 102 (45,38-206,82)	89,79±30,72 87,04 (30,72-206,82)	82,7±25,3 83,07 (30,72-172,97)	**<0,001**
Fat (TE%)	37,89±8,96 38 (22-58)	37,93±7,04 36 (25-59)	38,03±9,11 38 (21-53)	36,51±6,48 36 (21-53)	35,73±4,87 35 (25-49)	0,437

Saturated Fatty Acid (g)	27,21±13,49 25,64-(9,44-67,19)	38,87±13,66 36,66-(14,24-64,85)	36,86±12,1 33,72-(16,42-64,97)	31,29±11,37 32,04-(3,97-64,97)	28,91±10,16 28,73-(3,97-64,31)	**<0,001**
Polyunsaturated Fatty Acid (g)	20,46±9,99 18,77 (6,26-42,26)	22,03±10,17 21,12 (6,99-47,92)	22,93±12,62 20,4 (6,5-60,95)	22,23±10,82 21,48 (3,05-60,95)	21,77±9,87 21,83 (3,05-44,92)	0,978
Monounsaturated Fatty Acid (g)	35,98±16,34 28,4 (12,8-72,6)	37,18±14,53 34,98 (15,89-89,51)	37,48±16,27 33,45 (8,49-93,44)	29,39±13,71 27,39 (6,97-93,44)	25,73±10,45 25,14 (6,97-78,19)	**<0,001**
Cholesterol (mg)	540,52±256,03 587,5 (29-879)	624,87±242,16 696,92 (169,5-1144,65)	592,54±215,18 557,25 (195,3-1191,75)	413,93±243,24 397,4 (61,12-1095,25)	346,42±237,95 248 (61,12-1095,25)	**<0,001**
Fiber (g)	31,22±10,36 28,94 (14,23-55,33)	25,97±11,89 24,74 (7,65-54,32)	26,72±13,04 24,93 (8,1-72,42)	23,62±10,48 21,51 (5,92-72,42)	21,89±8,75 20,82 (5,92-52,15)	**<0,006**

[1]Kruskal Wallis test **TE:** Total Energy

There is statistically significant difference between Leagues and Energy (kcal), Carbohydrate (TE%), Protein (g), Protein (TE%), Fat (g), Saturated Fatty Acid (g), Monounsaturated Fatty Acid (g), Cholesterol (mg), Fiber (g) (Kruskal Wallis p<0,05).

Table 4. 16. Comparison of Daily Energy and Macro Nutrients Consumption of Soccer Players with Significance Depending on the League 1

	Post-Hoc Pairwise Comparisons				
p[2]	**Energy (kcal)**	**Carbohydrate (TE%)**	**Protein (g)**	**Protein (TE%)**	**Fat (g)**
Super league vs. TFF 1stleague	**<0,004**	0,511	**<0,001**	0,165	0,064
Super league vs. 2nd league	**<0,001**	0,942	0,028	0,856	0,045
Super league vs. 3rd league	0,188	0,008	0,093	**<0,002**	0,735

Super league vs. Amateur league	0,815	**<0,001**	**<0,001**	**<0,001**	0,591
TFF 1st league vs. 2nd league	0,566	0,530	0,214	0,080	0,799
TFF 1st league vs. 3rd league	**<0,002**	**<0,001**	**<0,001**	**<0,001**	0,008
TFF 1st league vs. Amateur league	**<0,001**	**<0,001**	**<0,001**	**<0,001**	**<0,001**
2nd league vs. 3rd league	0,007	**<0,001**	**<0,001**	**<0,001**	0,012
2nd league vs. Amateur league	**<0,001**	**<0,001**	**<0,001**	**<0,001**	**<0,001**
3rd league vs. Amateur league	0,147	0,070	0,015	0,022	0,134

[2]Mann-Whitney U test

According to post-hoc pairwise comparisons, there is significant difference between Super league and 2nd league in terms of Energy (kcal). There is significant difference between 2nd league vs. Amateur league, TFF 1st league vs. Amateur league in terms of all the parameters. There is significant difference 2nd league and Amateur League in terms of Energy (kcal) (Mann-Whitney U p<0,005 Bonferroni correction). The average of Energy (kcal) is higher in TFF 1stleague.

According to post-hoc pairwise comparisons, there is significant difference between Super league and TFF 1stleague in terms of Protein (g) and also significant difference was found between Super league and 3rd league in terms of protein (TE%). Moreover, it could be seen that Protein (g), protein (TE %) were differ in between Super league and Amateur league. There is significant difference between TFF 1st league vs. 3rd league in terms of Protein (g), protein (TE%), TFF 1st league vs. Amateur league.

2nd League and Amateur league differ each other in terms Protein (g), protein (TE%) (Mann-Whitney U p<0,005 Bonferroni correction).

The average of Protein (g), protein (TE%), Fat is higher in TFF.

Table 4. 17. Comparison of Daily Energy and Macro Nutrient Consumption of Soccer Players with Significance Depending on the League 2

	Post-Hoc Pairwise Comparisons			
p[2]	**Saturated Fatty Acid (g)**	**Monounsaturated Fatty Acid (g)**	**Cholesterol (mg)**	**Fiber (g)**

Super league vs. TFF 1stleague	**0,001**	0,615	0,163	0,092
Super league vs. 2nd league	0,005	0,710	0,993	0,135
Super league vs. 3rd league	0,068	0,101	0,037	**0,002**
Super league vs. Amateur league	0,234	0,013	0,006	**<0,001**
TFF 1st league vs. 2nd league	0,318	0,807	0,303	0,907
TFF 1st league vs. 3rd league	**<0,001**	**0,001**	**<0,001**	0,305
TFF 1st league vs. Amateur league	**<0,001**	**<0,001**	**<0,001**	0,103
2nd league vs. 3rd league	0,029	0,002	**<0,001**	0,229
2nd league vs. Amateur league	**0,003**	**<0,001**	**<0,001**	0,068
3rd league vs. Amateur league	0,226	0,067	0,052	0,344

[2]Mann-Whitney U test

According to post-hoc pairwise comparisons, there is significant difference between Super league and TFF 1stleague in terms of Saturated Fatty Acid (g).

2nd league and Amateur league differ each other in terms of Saturated Fatty Acid (g), Monounsaturated fatty acid (g) (Mann-Whitney U p<0,005 Bonferroni correction).

The average of Saturated Fatty Acid (g) is higher in TFF 1stleague. The average of Monounsaturated fatty acid (g) is higher in 2nd League.

Significant difference was found between Super league and 3rd league in terms of Fiber (g). Moreover, it could be seen that fiber (g), cholesterol (mg) were differ in between Super league and Amateur league.

The average of cholesterol (mg) is higher in TFF 1stleague. The average of fiber (g) is higher in Super league.

Table 4. 18. Distribution of Vitamin Consumption Values of Soccer players depending on the League

	Super League	**Tff 1st League**	**2nd League**	**3rd League**	**Amateur League**	
	Mean ±SD Med. (Min-Max)	**Mean ±SD Med. (Min-Max)**	**Mean ±SD Med.(Min-Max)**	**Mean ±SD Med. (Min-Max)**	**Mean ±SD Med. (Min-Max)**	**p**
Vitamin A (µg/RE)	1508,75 ±1455,62	1261,98±610,79 1143,1	1732,32±3813,57 1008,4	1012,05±718,86 923,84	980,18±827,03 841,55	**<0,001**

	1117,45 (358,74-7051,03)	(126,3-2847,32)	(673,72-23566,1)	(157,13-6569,81)	(157,13-6569,81)	
Vitamin E (mg)	24,05±9,07 24,05 (8,54-39,95)	21,41±10,06 21,9 (5,19-45,85)	22,13±11,42 19,89 (6,62-53,09)	21,41±10,24 20,42 (2,27-53,09)	21,07±9,58 20,42 (2,27-43,39)	0,798
Vitamin B_1 (mg)	1,21±0,43 1,12 (0,63-2,58)	1,06±0,341 (0,45-1,81)	1,09±0,37 1,14 (0,46-2,07)	0,92±0,34 0,89 (0,16-2,41)	0,86±0,31 0,84 (0,16-2,41)	**<0,001**
Vitamin B_2 (mg)	1,84±0,52 1,91 (0,98-2,97)	1,75±0,5 1,73 (0,81-3,17)	1,77±0,84 1,67 (0,97-6,05)	1,47±0,46 1,5 (0,19-2,81)	1,41±0,47 1,41 (0,19-2,81)	**<0,001**
Niacin (mg)	20,61±6,75 22,35- (8,95-31,72)	24,69±8,04 23,42- (11,93-46,52)	22,91±11,07 20,76- (7,61-57,22)	15,1±8,93 13,13- (1,39-50,67)	12,34±7,2 10,62- (1,39-50,67)	**<0,001**
Total Folic Acid (mcg)	445,94±129,17 447,9 (200,35-701,11)	367,47±119,82 376 (76,7-666,25)	384,32±152,39 343,1 (158,24-1005,46)	323,03±114,25 319,1 (61,58-1005,46)	300,11±88,92 307,82 (61,58-510,43)	**<0,001**
Vitamin B_{12} (mcg)	4,7±2,46 4,6- (1,6-12,39)	7,01±2,656,83- (1,83-12,88)	9,03±14,41 6,04- (0,8-89,75)	5,17±3,11 4,75- (0-15,85)	4,6±2,91 4,22- (0-12,57)	**<0,001**
Vitamin C (mg)	241,24±170,14 209,17 (46,67-644,96)	101,15±79,7 87 (7,56-360,53)	120,6±110,38 102,54 (9,26-524,03)	102,96±79,65 82,17 (0,42-397,6)	100,35±75,82 82,17 (0,42-397,6)	**<0,006**
Vitamin B_6 (mg)	2,36±0,72 2,26 (1-3,74)	2,03±0,582 (1,05-3,35)	1,78±0,63 1,76 (0,76-3,59)	1,44±0,53 1,4 (0,2-3,05)	1,32±0,47 1,36 (0,2-2,89)	**<0,001**

[1]Kruskal Wallis test

There is statistically significant difference between Leagues and Vitamin A (µg/RE), Vitamin B_1 (mg), Vitamin B_2 (mg), Niacin (mg), Total Folic Acid (mcg), Vitamin B_{12} (mcg), Vitamin C (mg), Vitamin B_6 (mg) (Kruskal Wallis p<0,05).

Table 4. 19. Comparison of Daily Vitamin Consumption of Soccer Players with Significance

				Post-Hoc Pairwise Comparisons				
p^2	**Vitamin A (µg/RE)**	**Vit.B_1 (mg)**	**Vit.B_2 (mg)**	**Vit.B_6 (mg)**	**Niacin (mg)**	**Tot. folic acid (mg)**	**Vit. B_{12} (µg)**	**Vit.C (mg)**
Super league vs. TFF 1stleague	1,000	0,243	0,403	0,090	0,140	0,029	**0,001**	**<0,001**
Super league vs. 2nd league	0,556	0,532	0,155	**<0,002**	0,684	0,033	0,018	0,006
Super league vs. 3rd league	0,041	**<0,002**	**<0,004**	**<0,001**	**<0,001**	**<0,001**	0,630	**<0,001**
Super league vs. Amateur league	0,015	**<0,001**	**<0,002**	**<0,001**	**<0,001**	**<0,001**	0,710	**<0,001**
TFF 1st league vs. 2nd league	0,265	0,911	0,559	0,056	0,195	0,932	0,407	0,656
TFF 1st league vs. 3rd league	**<0,003**	0,018	**<0,003**	**<0,001**	**<0,001**	0,015	**<0,001**	0,899
TFF 1st league vs. Amateur league	**<0,001**	**<0,001**	**<0,001**	**<0,001**	**<0,001**	**<0,002**	**<0,001**	0,943
2nd	0,033	0,013	0,026	**<0,004**	**<0,001**	0,026	0,010	0,612

league vs. 3rd league								
2nd league vs. Amateur league	0,005	**<0,001**	**<0,004**	**<0,001**	**<0,001**	**<0,003**	**0,001**	0,561
3rd league vs. Amateur league	0,297	0,169	0,300	0,148	0,032	0,243	0,211	0,906

[2]Mann-Whitney U test

According to post-hoc pairwise comparisons, there is significant difference between Super league and TFF 1stleague in terms of Vitamin B_{12} (µg). Moreover, it could be seen that Niacin (mg) were differ in between Super league and 3rd league, Super league and Amateur league.

There is significant difference between 2nd league and 3rd league in terms of Niacin (mg) and 2nd league and Amateur league differ each other in terms Niacin (mg), Vit. B_{12} (µg) (Mann-Whitney U p<0,005 Bonferroni correction).

The average of Niacin (mg) is higher in TFF 1stleague. The average of Vit. B_{12} (µg) is higher in 2nd League.

According to post-hoc pairwise comparisons, there is significant difference between Super league and TFF 1stleague in terms of Vit.C (mg) and also significant difference was found between Super league and 2nd league in terms of Vit.B_6 (mg).

Moreover, all parameters differ each other in between Super league vs. 3rd league except vit A and vit B_{12}.

There is significant difference between TFF 1st league vs. 3rd league in terms of Vit.B_2 (mg), Vit.B_6 (mg), Vit A and TFF 1st league vs. Amateur league in terms of Vit.B_1 (mg), Vit.B_2 (mg), Vit.B_6 (mg), Total folic acid, Vit A. The average of Vit A is higher in Super league.

There is significant difference between 2nd league vs. 3rd league in terms of Vit.B_6 (mg).

2nd league and Amateur league differ each other in terms Vit.B_1 (mg), Vit.B_2 (mg), Vit.B_6 (mg), Total folic acid (Mann-Whitney U p<0,005 Bonferroni correction).

The average of Vit.B1(mg), Vit.B_2 (mg), Vit.B_6 (mg), Total folic acid, Vit. C (mg) is higher in Super league.

Table 4. 20. Distribution of Daily Mineral Consumption Values of Soccer Players Depending on the League

	Super League	**Tff 1st League**	**2nd League**	**3rd League**	**Amateur League**	**p**
	Mean ±SD Med. (Min-Max)	**Mean ±SD Med. (Min-Max)**	**Mean ±SD Med. (Min-Max)**	**Mean ±SD Med. (Min-Max)**	**Mean ±SD Med. (Min-Max)**	
Potassium (mg)	3768,86±1160,78 3607,68 (1523,04-5753,53)	2988,13±872,87 2961,5 (1214-4668,37)	2909,46±943,26 2938,9 (1266,05-5072,65)	2485,55±971,85 2298,01 (257,36-5072,65)	2326,77±957,76 2174,32 (257,36-4774,83)	**<0,001**
Calcium (mg)	833,88±283,36 840,35 (438,02-1296,75)	825,77±362,15 781,72 (270,4-1887,85)	761,49±285,74 667,35 (368,6-1366)	688,32±282,49 664,21 (75,2-1510,7)	673,76±291,89 671,31 (75,2-1510,7)	0,062
Magnesium (mg)	425,91±127,81 410,01 (206,16-740,24)	353±111,03 338,28 (179,8-610,3)	348,46±118,94 330,92 (129,11-591,51)	278,14±115,98 265,7 (37,3-720,21)	248,89±101,18 248,35 (37,3-720,21)	**<0,001**
Phosphorus (mg)	1626,65±352,95 1666,63 (941,52-2358,94)	1798,69±411,48 1817,27 (1065,9-2783,1)	1745,42±535,36 1663,87 (700,03-3542,4)	1357,59±489,18 1304,5 (212,26-3542,4)	1205,97±385,45 1178,23 (212,26-2299,46)	**<0,001**
Iron (mg)	15,46±4,63 14,18 (10,21-27,03)	15,31±4,19 15,2 (6,8-25,16)	15,23±4,21 14,56 (8,04-26,68)	12,77±4,13 12,56 (2,83-26,68)	11,76±3,86 11,41 (2,83-23,97)	**<0,001**
Zinc (mg)	12,68±4,57 12,12 (6,19-27,99)	16,86±5,13 16,17 (6,02-28,51)	15,6±3,83 14,48 (8,84-25,37)	12,57±4,61 12,33 (2,21-25,64)	11,31±4,41 10,42 (2,21-25,64)	**<0,001**

[1]Kruskal Wallis test

There is statistically significant difference between Leagues and Potassium (mg), Magnesium (mg), Phosphorus (mg), Iron (mg), Zinc (mg).

Table 4. 21. Comparison of Daily Mineral Consumption of Soccer Players with Significance Depending on the League

	Post-Hoc Pairwise Comparisons					
p[2]	**Potassium (mg)**	**Calcium (mg)**	**Magnesium (mg)**	**Phosphorus (mg)**	**Iron (mg)**	**Zinc (mg)**
Super league vs. TFF 1stleague	0,015	0,709	0,043	0,105	0,656	**<0,001**
Super league vs. 2nd league	0,006	0,431	0,054	0,593	0,949	**<0,003**
Super league vs. 3rd league	**<0,001**	0,053	**<0,001**	0,004	0,023	0,984
Super league vs. Amateur league	**<0,001**	0,037	**<0,001**	**<0,001**	**<0,001**	0,154
TFF 1st league vs. 2nd league	0,574	0,384	0,840	0,444	0,644	0,265
TFF 1st league vs. 3rd league	**<0,004**	0,039	**<0,001**	**<0,001**	**<0,001**	**<0,001**
TFF 1st league vs. Amateur league	**<0,001**	0,037	**<0,001**	**<0,001**	**<0,001**	**<0,001**
2nd league vs. 3rd	0,029	0,276	**<0,002**	**<0,001**	**<0,003**	**<0,001**

league						
2nd league vs. Amateur league	**<0,004**	0,213	**<0,001**	**<0,001**	**<0,001**	**<0,001**
3rd league vs. Amateur league	0,268	0,770	0,092	0,034	0,089	0,041

[2]Mann-Whitney U test

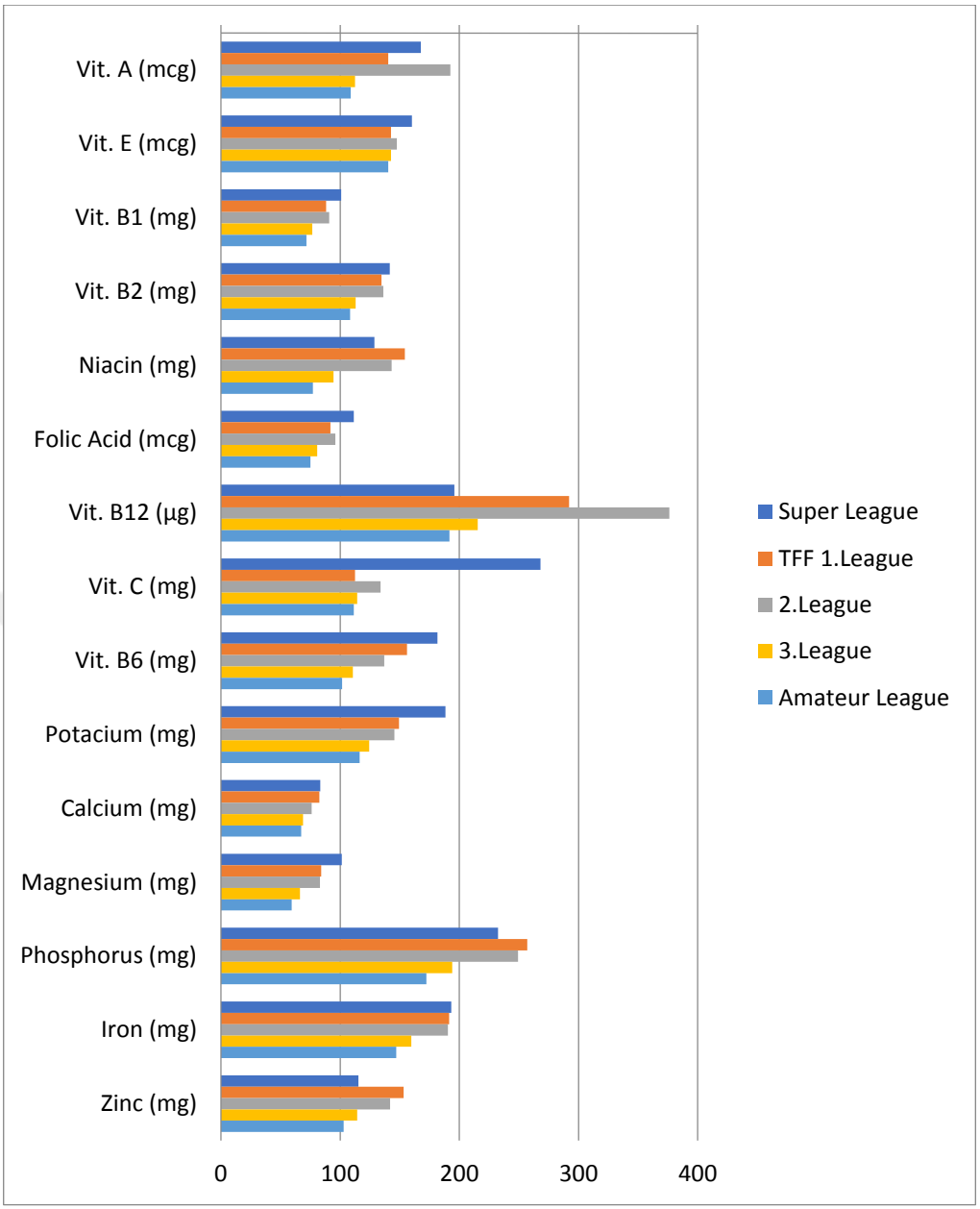
According to post-hoc pairwise comparisons, there is significant difference between Super league and TFF 1stleague, Super league and 2nd league in terms of Zinc (mg) and also significant difference was found between Super league vs. 3rd league in terms of Potasium (mg), Magnesium (mg).

Moreover, all parameters except calcium (mg), zinc (mg) differ each other in between Super league vs. Amateur league.

It could be seen that all parameters except calcium (mg) were differ in between TFF 1st league and 3rd league, TFF 1st league and Amateur league, 2nd league and Amateur league.

There is significant difference between 2nd league and 3rd league in terms of magnesium (mg), phosphorus (mg), mg, zinc (mg) (Mann-Whitney U p<0,005 Bonferroni correction).

The average of Potasyummg, calcium(mg), Magnesium (mg), ıron (mg), is higher in Super league. The average of phosphorus (mg), zinc (mg) is higher in amateur TFF 1st league.



RDA: Recommended Dietary Allowances

Figure 4.1. Distribution of Percentages of Soccer Players Covering Daily Micronutrient Reference Intake Values by League Levels

Table 4. 22. Nutritional Ergogenic Support Status of Soccer Players

		n	%
Do you use ergoogenic support (nutritional support product / products)?	**Yes**	280	73,7
	No	100	26,3
Who recommended your nutritional support product (s)?	**Coach**	135	35,5
	Doctor	69	18,2
	Nutritionist	73	19,2

	Internet	2	0,5
	Club	1	0,3
Where do you usually buy nutritional support products?	**Related Stores**	180	47,4
	Pharmacy	64	16,8
	Internet	36	9,5
What do you think is the use of nutritional support?	**Crispness**	71	18,7
	Prevention of Aging	15	3,9
	Increasing Immunity	14	3,7
	Performance Improvement	208	54,7
	Relaxation	24	6,3
	Cancer Prevention	1	0,3
	Slimming	8	2,1
	Increasing Muscle Mass	29	7,6
	Other	10	2,6
Are you using any vitamin or mineral supplements?	**Yes**	181	47,6
	No	199	52,4
Vit B_{12}	**Yes**	67	17,6
	No	313	82,4
Vit D	**Yes**	61	16,1
	No	319	83,9
Vit C	**Yes**	90	23,7
	No	290	76,3
Biotin	**Yes**	9	2,4
	No	371	97,6
Calcium	**Yes**	35	9,2
	No	345	90,8
Magnesium	**Yes**	75	19,7
	No	305	80,3
Iron	**Yes**	21	5,5
	No	359	94,5
Others	**Yes**	10	2,6
	No	370	97,4

Table 4. 23. Distribution of Nutritional Ergogenic Product Use Status by Soccer Players' Depending on the League

		Super League		**Tff 1st League**		**2nd League**		**3rd League**		**Amateur League**		**p**
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Do you use	**Yes**	17	85,0	39	97,5	52	86,7	55	68,8	117	65,0	**<0,006**

ergoogenic support (nutritional support product / products)?	**No**	3	15,0	1	2,5	8	13,3	25	31,3	63	35,0	
Who recommended your nutritional support product (s)?	**Coach**	10	50,0	14	35,0	24	40,0	26	32,5	61	33,9	**<0,001**
	Doctor	4	20,0	7	17,5	20	33,3	15	18,8	23	12,8	
	Nutritionist	3	15,0	16	40,0	8	13,3	14	17,5	32	17,8	
	Internet	0	0,0	1	2,5	0	0,0	0	0,0	1	0,6	
	Club	0	0,0	1	2,5	0	0,0	0	0,0	0	0,0	
During which period do you use these products?	**Out of Season**	0	0,0	0	0,0	0	0,0	7	12,7	15	12,8	**<0,006**
	Training Period	10	58,8	34	87,2	43	82,7	37	67,3	82	70,1	
	Competition Period	7	41,2	5	12,8	9	17,3	11	20,0	20	17,1	
Where do you usually buy nutritional support products?	**Related Stores**	6	35,3	22	56,4	32	61,5	41	74,5	79	67,5	**<0,001**
	Pharmacy	1	5,9	9	23,1	10	19,2	11	20,0	33	28,2	
	Internet	10	58,8	8	20,5	10	19,2	3	5,5	5	4,3	
How much do you spend on nutritional support products per year?	**0-500 TL**	0	0,0	8	20,5	9	17,3	20	36,4	36	30,8	**<0,001**
	500-1000 TL	3	17,6	20	51,3	19	36,5	20	36,4	46	39,3	
	1000 TL and above	14	82,4	11	28,2	24	46,2	15	27,3	35	29,9	
Are you familiar with nutritional support products?	**Yes**	17	85,0	22	55,0	20	33,3	23	28,8	44	24,4	**<0,001**
	No	1	5,0	5	12,5	20	33,3	26	32,5	69	38,3	
	Not Enough	2	10,0	13	32,5	20	33,3	31	38,8	67	37,2	
If yes, where did you learn this information?	**Coach**	4	23,5	4	18,2	4	20,0	5	21,7	11	25,0	-
	Books, Newspapers and Magazines	2	11,8	2	9,1	0	0,0	2	8,7	5	11,4	
	Course	1	5,9	1	4,5	2	10,0	1	4,3	10	22,7	
	Radio and Television	0	0,0	3	13,6	0	0,0	0	0,0	0	0,0	

	Dietitians	5	29,4	7	31,8	8	40,0	5	21,7	7	15,9	
	Former athletes	0	0,0	1	4,5	0	0,0	2	8,7	2	4,5	
	Scientific Activities such as Conference, Seminar	1	5,9	0	0,0	0	0,0	5	21,7	8	18,2	
	Doctor	4	23,5	4	18,2	6	30,0	3	13,0	1	2,3	
What do you think is the use of nutritional support?	**Crispness**	0	0,0	8	20,0	8	13,3	10	12,5	45	25,0	-
	Prevention of Aging	0	0,0	1	2,5	0	0,0	4	5,0	10	5,6	
	Increasing Immunity	2	10,0	3	7,5	1	1,7	2	2,5	6	3,3	
	Performance Improvement	10	50,0	21	52,5	37	61,7	51	63,8	89	49,4	
	Relaxation	0	0,0	0	0,0	3	5,0	6	7,5	15	8,3	
	Cancer Prevention	0	0,0	0	0,0	0	0,0	0	0,0	1	0,6	
	Slimming	0	0,0	0	0,0	2	3,3	2	2,5	4	2,2	
	Increasing Muscle Mass	7	35,0	7	17,5	5	8,3	3	3,8	7	3,9	
	Other	1	5,0	0	0,0	4	6,7	2	2,5	3	1,7	
What are your thoughts on using nutritional support products?	**I think it has benefits**	3	15,0	33	82,5	31	51,7	36	45,0	80	44,4	-
	I think it is a loss	6	30,0	3	7,5	12	20,0	5	6,3	5	2,8	
	Sometimes I think it has benefits	8	40,0	2	5,0	12	20,0	13	16,3	43	23,9	
	I do not know	3	15,0	1	2,5	5	8,3	25	31,3	46	25,6	
	No positive effect I think	0	0,0	1	2,5	0	0,0	1	1,3	6	3,3	

Fisher's Exact test

There is statistically significant difference between Leagues in terms of these questions given below:

Do you use ergoogenic support (nutritional support product / products)?

Who recommended your nutritional support product (s)?

During which period do you use these products?

Where do you usually buy nutritional support products?

How much do you spend on nutritional support products per year?

Are you familiar with nutritional support products? ($p<0,05$).

Tff 1st League players use more ergoogenic support and Super league players are more familiar with nutritional support products than other leagues.

Table 4. 24. Distribution of Vitamin / Mineral Supplement Usage Status of Soccer Players Depending on the League

		Super League		Tff 1st League		2nd League		3rd League		Amateur League		p
		n	%	n	%	n	%	n	%	n	%	
Are you using any vitamin or mineral supplements?	**Yes**	10	50,0	27	67,5	31	51,7	34	42,5	79	43,9	0,071
	No	10	50,0	13	32,5	29	48,3	46	57,5	101	56,1	
Vit B_{12}	**Yes**	2	10,0	13	32,5	11	18,3	12	15,0	29	16,1	0,108
	No	18	90,0	27	67,5	49	81,7	68	85,0	151	83,9	
Vit D	**Yes**	1	5,0	11	27,5	7	11,7	12	15,0	30	16,7	0,154
	No	19	95,0	29	72,5	53	88,3	68	85,0	150	83,3	
Vit C	**Yes**	4	20,0	19	47,5	21	35,0	20	25,0	26	14,4	**<0,001**
	No	16	80,0	21	52,5	39	65,0	60	75,0	154	85,6	
Biotin	**Yes**	0	0,0	0	0,0	0	0,0	1	1,3	8	4,4	0,153
	No	20	100,0	40	100,0	60	100,0	79	98,8	172	95,6	
Calcium	**Yes**	2	10,0	10	25,0	11	18,3	5	6,3	7	3,9	**<0,001**
	No	18	90,0	30	75,0	49	81,7	75	93,8	173	96,1	
Magnesium	**Yes**	5	25,0	25	62,5	19	31,7	8	10,0	18	10,0	**<0,001**
	No	15	75,0	15	37,5	41	68,3	72	90,0	162	90,0	
Iron	**Yes**	2	10,0	6	15,0	5	8,3	2	2,5	6	3,3	**<0,021**
	No	18	90,0	34	85,0	55	91,7	78	97,5	174	96,7	
Others	**Yes**	0	0,0	1	2,5	4	6,7	2	2,5	3	1,7	0,286
	No	20	100,0	39	97,5	56	93,3	78	97,5	177	98,3	

Fisher's Exact test

There is statistically significant difference between Leagues in terms of C Vit, Calcium, Magnesium, Iron ($p<0,05$). The Tff 1st League ratio of Vitamin C, Calcium, Magnesium and Iron is higher than the others.

Table 4. 25. Nutritional Ergogenic Support Product Information and Use Status of Soccer Players

		n	%
Polen : Do you know?	**Yes**	52	13,7
	No	328	86,3
Polen : Do you consume?	**Yes**	13	3,4
	No	367	96,6
Sports Drinks : Do you know?	**Yes**	262	68,9
	No	118	31,1
Sports Drinks : Do you consume?	**Yes**	158	41,6
	No	222	58,4
Energy Drinks : Do you know?	**Yes**	225	59,2
	No	155	40,8
Energy Drinks : Do you consume?	**Yes**	93	24,5
	No	287	75,5
Sod/Elect Tablets: Do you know?	**Yes**	71	18,7
	No	309	81,3
Sod/Elect Tablets : Do you consume?	**Yes**	26	6,8
	No	354	93,2
Omega-3 : Do you know?	**Yes**	137	36,1
	No	243	63,9
Omega-3 : Do you consume?	**Yes**	52	13,7
	No	328	86,3
Whey Protein : Do you know?	**Yes**	166	43,7
	No	214	56,3
Whey Protein : Do you consume?	**Yes**	42	11,1
	No	338	88,9
Aminoacids : Do you know?	**Yes**	79	20,8
	No	301	79,2
Aminoacids : Do you consume?	**Yes**	14	3,7
	No	366	96,3
Glutamine : Do you know?	**Yes**	64	16,8
	No	316	83,2
Glutamine : Do you consume?	**Yes**	13	3,4
	No	367	96,6
Protein bar : Do you know?	**Yes**	112	29,5
	No	268	70,5
Protein bar : Do you consume?	**Yes**	36	9,5
	No	344	90,5
Gels : Do you know?	**Yes**	72	18,9
	No	308	81,1

Gels: Do you consume?	**Yes**	33	8,7
	No	347	91,3
Cla : Do you know?	**Yes**	39	10,3
	No	341	89,7
Cla : Do you consume?	**Yes**	7	1,8
	No	373	98,2
L-Carnitine : Do you know?	**Yes**	57	15,0
	No	323	85,0
L-Carnitine : Do you consume?	**Yes**	8	2,1
	No	372	97,9
Creatine : Do you know?	**Yes**	71	18,7
	No	309	81,3
Creatine : Do you consume?	**Yes**	9	2,4
	No	371	97,6
Caffeine : Do you know?	**Yes**	126	33,2
	No	254	66,8
Caffeine: Do you consume?	**Yes**	55	14,5
	No	325	85,5
Bicarbonate : Do you know?	**Yes**	38	10,0
	No	342	90,0
Bicarbonate: Do you consume?	**Yes**	3	0,8
	No	377	99,2
Bcaa : Do you know?	**Yes**	70	18,4
	No	310	81,6
Bcaa : Do you consume?	**Yes**	30	7,9
	No	350	92,1
Antioxidants : Do you know?	**Yes**	34	8,9
	No	346	91,1
Antioxidants : Do you consume?	**Yes**	6	1,6
	No	374	98,4
Coenzyme : Do you know?	**Yes**	27	7,1
	No	353	92,9
Coenzyme : Do you consume?	**Yes**	7	1,8
	No	373	98,2

Table 4. 26. Nutritional Ergogenic Support Product Information and Use Status of Soccer Players Depending on the League

		Super League		**Tff 1st League**		**2nd League**		**3rd League**		**Amateur League**		**p**
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	
Polen :	**Yes**	13	65,0	14	35,0	4	6,7	12	15,0	9	5,0	**<0,001**

Do you know?	**No**	7	35,0	26	65,0	56	93,3	68	85,0	171	95,0	
Polen : Do you consume?	**Yes**	1	5,0	4	10,0	4	6,7	2	2,5	2	1,1	**0,034**
	No	19	95,0	36	90,0	56	93,3	78	97,5	178	98,9	
Sports Drinks : Do you know?	**Yes**	20	100,0	37	92,5	46	76,7	58	72,5	101	56,1	**<0,001**
	No	0	0,0	3	7,5	14	23,3	22	27,5	79	43,9	
Sports Drinks : Do you consume?	**Yes**	16	80,0	27	67,5	31	51,7	31	38,8	53	29,4	**<0,001**
	No	4	20,0	13	32,5	29	48,3	49	61,3	127	70,6	
Energy Drinks : Do you know?	**Yes**	20	100,0	35	87,5	33	55,0	51	63,8	86	47,8	**<0,001**
	No	0	0,0	5	12,5	27	45,0	29	36,3	94	52,2	
Energy Drinks : Do you consume?	**Yes**	2	10,0	21	52,5	22	36,7	24	30,0	24	13,3	**<0,001**
	No	18	90,0	19	47,5	38	63,3	56	70,0	156	86,7	
Sod/El : Do you know?	**Yes**	19	95,0	11	27,5	12	20,0	10	12,5	19	10,6	**<0,001**
	No	1	5,0	29	72,5	48	80,0	70	87,5	161	89,4	
Sod/El : Do you consume?	**Yes**	3	15,0	5	12,5	8	13,3	6	7,5	4	2,2	**<0,007**
	No	17	85,0	35	87,5	52	86,7	74	92,5	176	97,8	
Om-3 : Do you know?	**Yes**	20	100,0	28	70,0	30	50,0	31	38,8	28	15,6	**<0,001**
	No	0	0,0	12	30,0	30	50,0	49	61,3	152	84,4	
Om-3 : Do you consume?	**Yes**	1	5,0	17	42,5	20	33,3	8	10,0	6	3,3	**<0,001**
	No	19	95,0	23	57,5	40	66,7	72	90,0	174	96,7	
Whey prot: Do you know?	**Yes**	19	95,0	33	82,5	29	48,3	38	47,5	47	26,1	**<0,001**
	No	1	5,0	7	17,5	31	51,7	42	52,5	133	73,9	
Whey prot : Do you consume?	**Yes**	0	0,0	21	52,5	11	18,3	5	6,3	5	2,8	**<0,001**
	No	20	100,0	19	47,5	49	81,7	75	93,8	175	97,2	
Aa : Do	**Yes**	20	100,0	25	62,5	8	13,3	8	10,0	18	10,0	**<0,001**

you know?	**No**	0	0,0	15	37,5	52	86,7	72	90,0	162	90,0	
Aa : Do you consume?	**Yes**	0	0,0	7	17,5	2	3,3	1	1,3	4	2,2	**<0,001**
	No	20	100,0	33	82,5	58	96,7	79	98,8	176	97,8	
Glut : Do you know?	**Yes**	19	95,0	21	52,5	10	16,7	6	7,5	8	4,4	**<0,001**
	No	1	5,0	19	47,5	50	83,3	74	92,5	172	95,6	
Glut : Do you consume?	**Yes**	0	0,0	8	20,0	2	3,3	1	1,3	2	1,1	**<0,001**
	No	20	100,0	32	80,0	58	96,7	79	98,8	178	98,9	
Pro bar : Do you know?	**Yes**	20	100,0	27	67,5	23	38,3	16	20,0	26	14,4	**<0,001**
	No	0	0,0	13	32,5	37	61,7	64	80,0	154	85,6	
Pro bar : Do you consume?	**Yes**	2	10,0	10	25,0	7	11,7	5	6,3	12	6,7	**<0,007**
	No	18	90,0	30	75,0	53	88,3	75	93,8	168	93,3	
Gels : Do you know?	**Yes**	19	95,0	28	70,0	9	15,0	4	5,0	12	6,7	**<0,001**
	No	1	5,0	12	30,0	51	85,0	76	95,0	168	93,3	
Gels : Do you consume?	**Yes**	10	50,0	14	35,0	3	5,0	1	1,3	5	2,8	**<0,001**
	No	10	50,0	26	65,0	57	95,0	79	98,8	175	97,2	
Cla : Do you know?	**Yes**	17	85,0	10	25,0	3	5,0	1	1,3	8	4,4	**<0,001**
	No	3	15,0	30	75,0	57	95,0	79	98,8	172	95,6	
Cla : Do you consume?	**Yes**	0	0,0	0	0,0	2	3,3	1	1,3	4	2,2	0,706
	No	20	100,0	40	100,0	58	96,7	79	98,8	176	97,8	
L-Carn : Do you know?	**Yes**	19	95,0	17	42,5	8	13,3	4	5,0	9	5,0	**<0,001**
	No	1	5,0	23	57,5	52	86,7	76	95,0	171	95,0	
L-Carn : Do you consume?	**Yes**	0	0,0	3	7,5	2	3,3	1	1,3	2	1,1	0,105
	No	20	100,0	37	92,5	58	96,7	79	98,8	178	98,9	
Crea : Do you know?	**Yes**	19	95,0	17	42,5	15	25,0	8	10,0	12	6,7	**<0,001**
	No	1	5,0	23	57,5	45	75,0	72	90,0	168	93,3	
Crea : Do you consume?	**Yes**	0	0,0	0	0,0	4	6,7	2	2,5	3	1,7	0,156
	No	20	100,0	40	100,0	56	93,3	78	97,5	177	98,3	
Caf : Do	**Yes**	19	95,0	27	67,5	41	68,3	20	25,0	19	10,6	**<0,001**

you know?	**No**	1	5,0	13	32,5	19	31,7	60	75,0	161	89,4	
Caf : Do you consume?	**Yes**	3	15,0	19	47,5	18	30,0	9	11,3	6	3,3	**<0,001**
	No	17	85,0	21	52,5	42	70,0	71	88,8	174	96,7	
Bicarb : Do you know?	**Yes**	15	75,0	10	25,0	4	6,7	2	2,5	7	3,9	**<0,001**
	No	5	25,0	30	75,0	56	93,3	78	97,5	173	96,1	
Bicarb : Do you consume?	**Yes**	0	0,0	0	0,0	2	3,3	1	1,3	0	0,0	0,132
	No	20	100,0	40	100,0	58	96,7	79	98,8	180	100,0	
Bcaa : Do you know?	**Yes**	18	90,0	22	55,0	15	25,0	7	8,8	8	4,4	**<0,001**
	No	2	10,0	18	45,0	45	75,0	73	91,3	172	95,6	
Bcaa: Do you consume?	**Yes**	0	0,0	13	32,5	10	16,7	5	6,3	2	1,1	**<0,001**
	No	20	100,0	27	67,5	50	83,3	75	93,8	178	98,9	
Antiox : Do you know?	**Yes**	16	80,0	11	27,5	0	0,0	0	0,0	7	3,9	**<0,001**
	No	4	20,0	29	72,5	60	100,0	80	100,0	173	96,1	
Antiox : Do you consume?	**Yes**	0	0,0	2	5,0	0	0,0	0	0,0	4	2,2	0,195
	No	20	100,0	38	95,0	60	100,0	80	100,0	176	97,8	
Coenz : Do you know?	**Yes**	9	45,0	10	25,0	2	3,3	1	1,3	5	2,8	**<0,001**
	No	11	55,0	30	75,0	58	96,7	79	98,8	175	97,2	
Coenz : Do you consume?	**Yes**	0	0,0	2	5,0	2	3,3	1	1,3	2	1,1	0,405
	No	20	100,0	38	95,0	58	96,7	79	98,8	178	98,9	

Fisher's Exact test

There is statistically significant difference between Leagues in terms knowing polen, sports drinks, energy drinks, sodium/electrolyte tablets, omega 3 ($p<0,05$). The knowledge is higher for Super League players than the other leagues.

There is statistically significant difference between Leagues in terms consuming polen, sports drinks, energy drinks, sodium/electrolyte tablets, omega 3 ($p<0,05$). The consumption is higher for TFF 1st League players than the other leagues.

There is statistically significant difference between Leagues in terms knowing all nutrition support products that were shown in the table above ($p<0,05$). The knowledge is higher for Super League players than the other leagues.

There is statistically significant difference between Leagues in terms consuming Protein powders (whey protein), Amino acids, Glutamine, Protein bar, Sports gels, CLA, Caffeine, BCAA, Coenzyme (CoQ_{10}) ($p<0,05$). The consumption is higher for TFF 1st League players than the other leagues.

Table 4. 27. Frequency and Amount of Nutritional Ergogenic Support by Soccer Players

	Mean ±SD **Med.(Min-Max)**
Polen : Consumption frequency	5,92±3,15 7 (1-9)
Polen Quantity (g)	10±0 10 (10-10)
Sports drinks : Consumption frequency	7,13±2,24 7 (2-10)
Sports drinks Quantity (mL)	496,31±117,85 500 (200-1000)
Energy drinks : Consumption frequency	6,72±2,44 6 (2-10)
Energy drinks Quantity (mL)	251,29±36,92 250 (1-500)
Sod/Elekt tabl. : Consumption frequency	6,27±2,55 6 (3-10)
Sod/Elekt tabl. Quantity (tablet)	1±0 1 (1-1)
Om-3 : Consumption frequency	8,25±1,76 9 (2-10)
Om-3 Quantity (capsule)	1±0 1 (1-1)
Whey protein : Consumption frequency	7,64±2,24 9 (4-10)
Whey protein Quantity (g)	30±0 30 (30-30)
Aminoacids : Consumption frequency	8,21±2,81 10 (3-10)
Aminoacids Quantity (serving)	1±0 1 (1-1)
Glutamine : Consumption frequency	5,85±3,26 5 (2-10)
Glutamine Quantity (g)	5,38±1,39 5 (5-10)
Protein bar : Consumption frequency	6,54±2,12 6 (4-10)
Protein bar Quantity (g)	3,86±12,12 0 (0-60)
Sports gels : Consumption frequency	5,78±2,18 6 (1-10)
Sports gels Quantity (pack)	1±0 1 (1-1)
Cla : Consumption frequency	9,29±0,49 9 (9-10)

Cla Quantity (capsule)	1±0 1 (1-1)
L-Carnitine : Consumption frequency	7,63±1,85 7 (5-10)
L-Carnitine Quantity (capsule)	1±0 1 (1-1)
Creatine : Consumption frequency	6,89±3,89 10 (2-10)
Creatine Quantity (g)	5,11±2,26 5 (1-10)
Caffeine : Consumption frequency	7,6±2,45 9 (3-10)
Caffeine Quantity (mg)	98,11±9,62 100 (50-100)
Bicarbonate : Consumption frequency	4±0 4 (4-4)
Bicarbonate Quantity (g)	5±0 5 (5-5)
Bcaa : Consumption frequency	6,17±2,32 5,5 (4-10)
Bcaa Quantity (g)	5,2±0,41 5 (5-6)

Table 4. 28. Frequency and Amount of Nutritional Ergogenic Support by Soccer Players Depending on the League.

	Super League	**Tff 1st League**	**2nd League**	**3rd League**	**Amateur League**	**p**
	Mean ±SD Med. (Min-Max)	**Mean ±SD Med. (Min-Max)**	**Mean ±SD Med. (Min-Max)**	**Mean ±SD Med. (Min-Max)**	**Mean ±SD Med. (Min-Max)**	
Polen : Consumption frequency	1 sabit	6,75±1,71 6,5(5-9)	5,5±4,04 5,5(2-9)	5,5±4,95 5,5(2-9)	8±0 8(8-8)	0,583
Polen Quantity (g)	10 sabit	10±0 10(10-10)	10±0 10(10-10)	10±0 10(10-10)	10±0 10(10-10)	1,000
Sports drinks : Consumption frequency	5,75±1,06 6(4-8)	6,85±1,99 7(4-10)	7,65±2,17 8(3-10)	6,65±2,43 6(2-10)	7,66±2,34 9(2-10)	**<0,008**
Sports drinks Quantity (mL)	494,12±24,25 500(400-500)	579,63±186,19 500(400-1000)	496,77±142,56 500(400-1000)	463,23±80,8 500(200-600)	474,07±67,81 500(200-600)	**<0,006**
Energy drinks : Consumption frequency	6±0 6(6-6)	6,95±2,13 6(4-10)	7,36±2,24 8(4-10)	5,88±2,64 6(2-10)	6,83±2,66 6(2-10)	0,450
Energy drinks Quantity (mL)	250±0 250(250-250)	240,05±55,1 250(250-270)	261,74±52,11 250(250-500)	250,83±4,08 250(250-270)	251,67±5,65 250(250-270)	0,964
Sod/El : Consumption frequency	4,67±1,15 4(4-6)	8±1,58 8(6-10)	6,25±2,96 6,5(3-9)	6,17±2,48 6(3-9)	5,5±3,32 4,5(3-10)	0,488

Sod/El Quantity (tablet)	1±0 1(1-1)	1±0 1(1-1)	1±0 1(1-1)	1±0 1(1-1)	1±0 1(1-1)	1,000
Om-3 : Consumption frequency	6 stable	8,41±1,8 9(4-10)	8,8±1,01 9(7-10)	9±0,93 9(7-10)	5,33±1,63 6(2-6)	0,200
Om-3 Quantity (capsule)	1 stable	1±0 1(1-1)	1±0 1(1-1)	1±0 1(1-1)	1±0 1(1-1)	1,000
Whey prot : Consumption frequency	-	6,62±2,22 6(4-10)	8,27±1,85 9(6-10)	8,2±2,05 9(6-10)	10±0 10(10-10)	**<0,001**
Whey prot Quantity (g)	-	30±0 30(30-30)	30±0 30(30-30)	30±0 30(30-30)	30±0 30(30-30)	1,000
Aa : Consumption frequency	-	6,43±3,1 5(3-10)	10±0 10(10-10)	10 stable	10±0 10(10-10)	0,078
Aa Quantity (serving)	-	1±0 1(1-1)	1±0 1(1-1)	1 stable	1±0 1(1-1)	1,000
Glut : Consumption frequency	-	6,25±2,6 5(4-10)	2±0 2(2-2)	2 stable	10±0 10(10-10)	**<0,032**
Glut Quantity (g)	-	5±0 5(5-5)	5±0 5(5-5)	10 stable	5±0 5(5-5)	**<0,007**
Pro bar : Consumption frequency	5±1,41 5(4-6)	6,4±2,01 5,5(4-10)	7±2,37 6(5-10)	6,6±2,41 6(4-10)	6,67±2,27 6(4-10)	0,844
Pro bar Quantity (g)	4±12,31 0(0-40)	10,65±19,24 0(0-60)	3,87±11,74 0(0-40)	2,65±10,47 0(0-50)	2,87±10,41 0(0-50)	**<0,009**
Gels : Consumption frequency	5,4±0,7 5,5(4-6)	5,15±2,03 5(1-9)	7,33±2,31 6(6-10)	6 stable	7,2±3,83 10(3-10)	0,441
Gels Quantity (pack)	1±0 1(1-1)	1±0 1(1-1)	1±0 1(1-1)	1 stable	1±0 1(1-1)	1,000
Cla : Consumption frequency	-	-	9±0 9(9-9)	9 stable	9,5±0,58 9,5(9-10)	0,407
Cla Quantity(capsule)	-	-	1±0 1(1-1)	1 stable	1±0 1(1-1)	1,000
L-Carn : Consumption frequency	-	6,67±2,08 6(5-9)	7±0 7(7-7)	7 stable	10±0 10(10-10)	0,211
L-Carn Quantity (capsule)	-	1±0 1(1-1)	1±0 1(1-1)	1 stable	1±0 1(1-1)	1,000
Crea : Consumption frequency	-	-	6±4,62 6(2-10)	6±5,66 6(2-10)	8,67±2,31 10(6-10)	0,687
Crea Quantity (g)	-	-	4±2 5(1-5)	5±0 5(5-5)	6,67±2,89 5(5-10)	0,311
Caf : Consumption frequency	7,33±1,53 7(6-9)	7,53±2,22 9(3-10)	7,94±2,55 9,5(4-10)	8,11±2,67 10(4-10)	5,5±3,11 4,5(3-10)	0,331
Caf Quantity (mg)	83,33±28,87 100(50-100)	97,37±11,47 100(50-100)	100±0 100(100-100)	100±0 100(100-100)	100±0 100(100-100)	0,078
Bicarb : Consumption frequency	-	-	4±0 4(4-4)	4 stable	-	1,000

Bicarb Quantity (g)	-	-	5±0 5(5-5)	5 stable	-	1,000
Bcaa : Consumption frequency	-	5,54±1,98 5(4-10)	6,2±2,35 6(4-10)	6,2±2,49 6(4-10)	10±0 10(10-10)	0,191
Bcaa Quantity (g)	-	5,31±0,48 5(5-6)	5,1±0,32 5(5-6)	5,2±0,45 5(5-6)	5±0 5(5-5)	0,573

[1]Kruskal Wallis test

There is statistically significant difference between Leagues and Sports drinks frequency, Sports drinks Quantity, Whey protein frequency, Glutamine frequency, Glutamine Quantity, Protein bar Quantity (Kruskal Wallis p<0,05).

Table 4. 29. Comparison of Frequency and Amount of Nutritional Ergogenic Support with Significance Depending on the League.

	Post-Hoc Pairwise Comparisons					
p[2]	**Sports drinks frequenc**	**Sports drinks Quantity**	**Whey protein frequency**	**Glutamine frequency**	**Glutamine Quantity**	**Protein bar Quantity**
Super league vs. TFF 1stleague	0,095	0,088	-	-	-	0,171
Super league vs. 2nd league	0,002	0,092	-	-	-	0,983
Super league vs. 3rd league	0,140	0,128	-	-	-	0,572
Super league vs. Amateur league	**<0,004**	0,233	-	-	-	0,649
TFF 1st league vs. 2nd league	0,115	**<0,003**	0,020	0,044	1,000	0,040
TFF 1st league vs. 3rd league	0,943	**<0,004**	0,091	0,222	0,222	**<0,004**
TFF 1st league vs. Amateur league	0,037	**<0,002**	**<0,001**	0,089	1,000	**<0,001**
2nd league	0,110	0,949	1,000	1,000	0,667	0,440

vs. 3rd league						
2nd league vs. Amateur league	0,621	0,351	0,052	0,333	1,000	0,499
3rd league vs. Amateur league	0,064	0,408	0,151	0,667	0,667	0,798

[2]Mann-Whitney U test

According to post-hoc pairwise comparisons, there is significant difference between Super league and Amateur league in terms of Sports drinks frequency and also significant difference was found between TFF 1st league vs. 2nd league in terms of Sports drinks Quantity. Moreover, it could be seen that Sports drinks Quantity, Protein bar Quantity were differ in between TFF 1st league vs. 3rd league, TFF 1st league vs. Amateur league. There is significant difference between TFF 1st league vs. Amateur league in terms Whey protein frequency (Mann-Whitney U $p<0,005$ Bonferroni correction). The average of Sports drinks: Consumption frequency, Whey protein frequency, Glutamine frequency is higher in Amateur league. The average of Sports drinks Quantity, Protein bar Quantity is higher in Tff 1st League and the average of Glutamine Quantity is higher in 3rd League.

5. DISCUSSION and CONCLUSION

Soccer is an intermittent activity that requires both strength and endurance in a high intensity and 90 minute period. In case of adequate and balanced nutrition of the players, high level efficiency can be provided in the trainings. In addition to nutrition, athletes are looking for reinforcements in order to increase their physical performance, which leads them to ergogenic supports. It is known that nutritional supplements used for ergogenic purposes may have positive effects as well as negative effects. The aim of this study is to determine the nutritional status of soccer players and to search the frequency, amount, aims and awareness with regards to using nutritional ergogenic support products which have been used in an increasing manner in recent years and also to determine the differences of players in various leagues.

- **Socio-Demographic Characteristics and General Training conditions of Soccer Players**

When the educational status of the soccer players is examined, 5.3% are primary school graduates, 77.9% are secondary school graduates and 16.8% are university graduates (Table 4.1). In the study, education level was found to be significant according to league level. While the rate of university graduates in super league soccer players is 60%, it is 15.0% in amateur league (Table 4.2). The school term can be considered to be the most productive period for soccer players to improve themselves physically and technically. This difference may occur from time to time due to the fact that the economic conditions of amateur soccer players in our country affect the educational opportunities. At the same time, this result is likely to occur because soccer players continue to train or work.

The average age of the players participating in the study is observed as 24 ± 5 (Table 4.3). When the average age of the players participating in the study is examined according to the leagues, the average age is seen as 28 ± 5 for Super League, 26 ± 5 for TFF 1.League, 25 ± 4 for 2.League, 25 ± 5 for 3.League and 22 ± 3 for Amateur League. There is a statistically significant difference between professional and amateur players. In the study that was conducted in Turkey by Saygın et.al. (2009) no statistical significance was observed. The average age of professional soccer players was 24.6 ± 3.8 and the average

age of amateur players was 23.2 ± 3.8 (231). In amateur Soccer clubs, younger players are preferred to provide new players to Turkish football. For this reason, amateur soccer players are thought to be younger than other leagues players.

While the average height of the soccer players participating in this study is 179 ± 7 cm (Table 4.3), the average height of Super League, TFF 1st League, 2nd League, 3rd League and Amateur League players are 183 ± 6 cm, 182 ± 6 cm, 181 ± 6 cm, 180 ± 6 cm and 177 ± 7 cm respectively. The fact that soccer players are professional and amateur led to significant results. In another study conducted in Europe, the height of professional soccer players was found to be 184.2 ± 5.9 cm (232). In a study conducted by Hidalgo et al. in 2015, the average height of amateur soccer players in the age group of 19 was 175.6 ± 2.77 cm (233). These studies shows similarity with ours. As the league level increases, the selection of players with high physical quality is one of the most important reasons for preference. Height is one of the important parameters in this regard which makes a difference. In the light of this information, it can be said that professional soccer players are fed correctly, balanced, quality since a young age.

The average body weight of all soccer players participating in this study was 75 ± 7 kg (Table 4.3). In a study in Australia, the average body weight of 45 players was recorded as 86.8 ± 7.9 kg (234). When the results of the literature are examined, it is seen that soccer players in developed countries are overweight compared to our study. When the body weights of soccer players are classified according to leagues, the average body weights of Super League, TFF 1st League, TFF 2nd League, TFF 3rd League and Amateur League players respectively are 76 ± 5 kg, 78 ± 6 kg, 77 ± 7 kg, 78 ± 5 kg and 73 ± 7 kg. In our study, no significance was observed statistically between super league and amateur league while significance was observed between other professional leagues and amateur leagues (Table 4.5). In Australia, the average body weight of professional and semi-professional team players over 18 years old was found as 79.6 ± 7.7 kg and 75.6 ± 7.6 kg. respectively (235). In contrast to our study, no difference in significance statistically was observed in this study. In a study conducted by Hidalgo et al. in 2015, the average body weight of amateur players with age group 19 was determined as 68.3 ± 2.01 kg (233). The average body weight of UK Premier League professional soccer players was recorded as 80.5 ± 8.7 kg (236).

Due to the limited economic conditions of amateur players, it can be predicted that their weight is low as they do not have the opportunity to have an accurate and balanced nutrition programme under the control of dietician. Nutritional imbalances sometimes cause players to be underweight and sometimes to gain or lose unbalanced weight. In general, it can be concluded that the nutritional status of amateur league players in our country is not good enough.

In our study, it was found that soccer players had training an average of 4.18 ± 1.58 days/week (Table 4.3). Similarly, the number of training sessions per week of UK Premier League professional soccer players has been reported as 5 days (236). However, in our study, there is a significance in terms of the number of training days between some leagues. It was found that 5,93 ± 0,57 days/week training was performed in TFF 1st League, while 2.89 ± 1.1 days/week in Amateur League (Table 4.4). The reason for this difference is that professional soccer players can devote time to their profession by choosing Soccer as a profession. However, amateur soccer players are not able to devote full time to training because they have their education or work somewhere to earn their livings simultaneously with trainings.

Soccer players have trainings of 1.52 ± 0.42 hours/day/week (Table 4.3). When we compare weekly training hours of the leagues, a significant result was obtained between TFF 1st League and Amateur League (Table 4.5).

- **Nutrıtıon Conditions of Soccer Players**

The players who think that their nutrition is adequate and balanced are found to be 85% in Super League and 50.0% in Amateur League and these rates have been considered statistically significant (Table 4.7). Because it is said that as the league level of professional soccer players increases, the economic levels of soccer players increase and therefore they can be fed more refined. At the same time, the presence of a dietician in the super league and the regulation of calorie, micro and macro nutrients on a daily basis can be seen as a reason.

In our study, when soccer players in Soccer Leagues were examined according to whether they have a nutrition program, the average of soccer players with a nutrition programme was 45.0% in the Super League and 62.5% in the 3rd League and significance was observed between them (Table 4.7). The reason for the fact that the Super League is lower than the 3rd League is due to the high number of dieticians in the Super League.

Every meal of the super league is made within a certain program. Therefore, no additional program was required.

According to our study, for their nutrition programs 38.3% of the players get support from their trainer, 17.6% from a dietitian, 16.1% from their club doctor, 13.5% from their friends, 8.3% from books and similar sources and 6,2% from written and visual media (Table 4.6). In a study conducted on 30 young soccer players in Italy, it was observed that 60% of soccer players received support from their trainer, and when a group of 88 National Collegiate Athletic Association (NCAA) Division III (DIII) soccer players is examined it was observed that 25% of the players received support from their trainers (237,238). When these studies were compared with our study, similar results were obtained. According to our study, the nutrition program in the super league and in the 1st league is prepared by the dietician, while in the 2nd League, 3rd League and Amateur League it is prepared by the trainer (Table 4.7). In the case of a dietitian in the league and club, the above-mentioned results change and it is thought that as the league level decreases, coaches with less knowledge about nutrition mislead other players.

Many soccer players and trainers often define the factors needed for successful performance as motivation, training and genetic status and see the nutrition as a secondary factor (30). According to our research, 80.5% of professional and amateur soccer players think that there is a relationship between nutrition and achievement (Table 4.6).

It was observed that 79.7% of the players did not skip breakfast, 84.5% of them did not skip lunch and 84.5% of them did not skip dinner while all of them skipped snacks (Table 4.8). In a study by Göral et al., 86.7% of soccer players stated that they had 3-4 meals a day (239). This study shows parallelism with the literature. In our study, the consumption of snacks is observed as 37.9% for brunch (mid afternoon), 51.8% for late afternoon and 41.1% for night (Table 4.8). As is seen, the majority of soccer players have 3 main meals a day. Excessive number of meals consumed by athletes is of great importance because they are spending more energy. It is understood from the studies that athletes who have at least three meals a day and even increase the number of meals to five or 6 (3 main + 2-3 intervals) applies the correct way of nutrition. Consuming meals by distributing them to 5-6 will provide continuity in soccer players blood sugar levels and saturation in muscle glycogen stores. (240).

In our study conducted according to which league it is, the rate of last meal consumed 1-2 hours prior to the competition in the super league is 95.0%, in the Amateur

League it is 63% and in the 3rd League it is 61.3% . The last meal consumed in theTFF 1st League and TFF 2nd League prior to the competition is 65% and 70,0.% respectively (Table 4.12). In the study conducted by Saygın et al. (2009), all of the professional soccer players and an average of 92.5% of amateur players stated that they had the last meal 3-4 hours prior to the the competition (231). The results of our study are different when compared to other studies. If the consumption of competition meal is made according to an expert guidance whether it is professional or amateur league these differences can be reduced.

38.2% of the athletes participating in our study stated that they take nutrition rich in protein, 19.7% take nutrition rich in protein and carbohydrate, 7.9% take nutrition rich in carbohydrate and 1.1% take nutrition rich in fat before the training and competition where 33.2% of them stated that they made no changes (Table 4.13). In the study conducted by Akıl, 52.4% of the athletes preferred vegetable and fruit before the competition, and in the study conducted by Bozkurt (2001) 55.4% of the athletes preferred Bakery soup, toast, honey or jam (241). In our study, it was observed that protein rich nutrition is mostly preferred, while in other studies carbohydrate rich nutrition is preferred mostly. This result shows that the players in our study do not have knowledge about this subject.

In the answers of the amateur and professional soccer players who participated in the research, it was seen that Super League (60%) and TFF 1st league (42.5%) players had mainly protein and carbohydrate in their meals. 2nd League (51.7%) and 3rd League (42.5%) players were found to be protein-fed. It was observed that amateur league soccer players (42.8%) preferred not to make any changes in their nutrition. (Table 4.14). As a result, as the league level decreases, the rate of correct nutrition before training / competition decreases. The reason for not making any changes in the nutrition of amateur soccer players is thought to be due to their lack of knowledge or limited knowledge on this subject. In the studies which carbohydrate intake was examined during the competition days, it was found that the consumption of carbohydrate occurred during the pre-competition training, but did not meet the recommended intake for the competition (242).

In this study, athletes stated that 75% of the them meet their liquid needs by water, 11.8% of them by sports drink, 3.7% of them by mineral water and fruit juice, 3.4% of them by cola, 1.1% of them by protein powder and 0.8% of them by salty buttermilk (Table 4.13). According to Bozkurt and Nizamoğlu's study, 64.2% of the team athletes meet their liquid needs with sugary fruit juice, whereas according to the study conducted

by Yıldırım et al. (2005), between the periods 47.5% of basketball players prefer drinking only water and 13.5% of them prefer to drink sugary fruit juice (241,243). In the study conducted by Öztürk (2006), it was stated that during the competition, 70% of soccer players consumed water, 15.0% of them consumed mineral water, 7.5% of them consumed special drinks, 5.0% of them consumed fruit juice and 2.5% of them did not consume anything (244). In the study conducted by Yarar et al. (2011), 41.3% of elite athletes drink plenty of water during the competition or between the periods, 18.6% prefer sports drink, 11.4% prefer tea, coffee and 10.2% prefer fruit juice (1). Considering the results of these studies, the most consumed beverage shows similarity with our study.

When considering the discrepancies between professional and amateur leagues in our study, water and sports drink (45%) were preferred at the same rate in the super league; whereas more water was preferred in all other leagues (Table 4.14). This is due to the fact that the super league players are provided with sports drinks by the club during the training or match whereas in other leagues, this need is not met by the clubs.

After the training, 1-1.5 g/kg CHO carbohydrate should be consumed as soon as possible (within 15-30 minutes) for replenishment of glycogen stores and this should be repeated every 2 hours for 6 hours (37). It was observed that most of the players who participated in our research preferred to drink plenty of water (40.3%) in the first place right after the training or the competition and in the second place they preferred carbohydrate rich foods (18.9%) (Table 4.13). In a study conducted, 32.7% of the athletes preferred carbohydrate rich food and 20.0% of them did not make any changes in their diet (37). There is no similarity between the other studies with regards to the most common way. It is thought that the general knowledge of the players on this subject is weak.

In our study, taking into account the consumption the after training /competition depending on the League, the super league (45%) and TFF 1.League (37.5%) soccer players marked the consumption of carbohydrate-rich foods. In other leagues, this consuption level is observed to be below 30%. TFF 3.League (46.3%) and Amateur League (48.3%) soccer players marked as "I drink plenty of water" regarding the after training/competition consumption (Table 4.14). In our study, it was observed that the nutrition and information habits of the Super League and TFF1.League players for the recovery of the body after the training or competition were sufficient and it was predicted that this situation is uncommon as the league level decrease.

- **Energy and Nutritional Consumption of Soccer Players**

Taking into account the diet of team sport athletes, the macro nutrient composition is insufficient to meet the energy, recovery and performance demands of the athletes. In the studies conducted, it is observed that instead of not consuming carbohydrates, athletes consume high amounts of protein and fat, and macronutrient imbalance was detected in most of them. It has been found that athletes have protein rich diet whereas low dietary intake (hypocaloric) in terms of carbohydrate and / or total energy (242). In a study conducted in 2011, it was observed that soccer players consume a diet that contains too much protein and fat and a low carbohydrate-containing diet (245). Gastrointestinal system problems (such as diarrhea, cramping, bleeding) may occur in athletes who are fed with an incorrect diet (high fat, high pulp, high protein, concentrated cho solutions, excessive volume nutrition) (246). This can affect the player, the player's performance and the team, and may have many negative consequences. Therefore, it is very important that the Soccer consciously take the nutrients he needs to take daily. Although nutrition in soccer players plays a key role in performance, there are few studies showing the nutritional status of soccer players in detail. Therefore detailed energy, macro and micro nutrient uptakes of all professional and amateur soccer players are included in this study.

In order for athletes to optimise training and performance, they need to consume sufficient energy for the work required and to support physiological adaptions (253). Evidence is provided that team energy athletes' energy intake is insufficient and does not meet the recommendations when evaluated by IOC, ACSM, ISSN and sport-specific research (242).

In our study, the total daily calorie intake of soccer players is 2213.85 ± 545.83 kcal, and this intake is lower compared to the other studies (Table 4.15). In a study conducted in Italy in 2015, the average calorie intake of soccer players was calculated as 2844.0 ± 51.4 kcal (247). In order to better define and inform the energy requirements of the English Premier League 6 professional soccer players during the season, similiar to this study, 24 hours of food consumption recording was applied to athletes exercising 5 days a week by using reminding method, and the average daily energy intake was found to be 3186 ± 367 kcal (236). Considering the daily calorie intake of soccer players our study was found to be low in terms of calorie intake compared to other studies.

In our study, considering the calorie intake according to leagues, for Super League 2096.45 ± 540.83 kcal / day, for TFF 1.League 2489.99 ± 548.01 kcal/day, for TFF 2.League 2449.13 ± 480.21 kcal / day, for TFF 3rd League 2171,03±535,3 kcal/day and for Amateur League 2053,58 ± 512,23 kcal / day avarage values were found (Table 4.16). When the results were examined, a statistically significant results was determined between Super League and TFF 1st league, Super League and 2nd League, TFF 1st League and TFF 3rd League and TFF 1st League and Amateur League (Table 4.17). In contrast to these results, the average daily energy intake of 14 Senior Professional and 15 Youth Elite Soccer Players were found to be 2988 ± 583 kcal / day and 2938 ± 465 kcal / day, respectively (248). Similarly, in a study conducted by professionals and amateurs in Australia, 45 soccer players were separated as experienced (23 soccer players) and inexperienced (22 soccer players) and similarities were found in daily calorie intake (234). In a review study, "food recall", "diet record'' and calorie intake according to competition levels were examined. Energy intake was determined as 2740 ± 531 kkal for the Spanish 1st league Soccer team, 3030 ± 141 kcal for the 4th league Soccer team; 2560 ± 636 kcal for Italy 1st league Soccer team; and 2831 kcal for England 2nd league Soccer team (249). Calorie intake in different countries and leagues between the leagues in our country in general is not seen similar; only the calorie intake of the Italian Soccer team in the 1st league was similar to the TFF 1st League in our study. As the league level of Spanish Soccer decreases, the amount of calorie decrease is similar to the results of our study. In a study conducted in Turkey's leagues, Super League, TFF 2nd League and TFF 3rd League of daily calories that soccer players take are 2551.5 ± 345.38, 376.33 ± 2667.9, 2438.2 ± 652.90 kcal / day, respectively (250). In this study, similar to our study, no significant results were observed as the league level decreased. While the similarities were observed in calorie intake of the Super League and Amateur Leagues, similarities occurred in between the other leagues. In this context, it can be concluded that although the super-league has the same calories with the amateur league, the nutrition has been more quality and correct in the Super League, and also nutrition in other leagues is almost the same quality. At the same time, it was considered that in this study the differences in the league levels and differences in energy intake of the players have given quite variable results due to age, competition levels and training loads of the players examined, diversity of training situations, differences in nutritional knowledge levels or the use of various methodologies and experimental designs.

Carbohydrate intake is important for optimising performance and recovery. Team sports have varied training and physiological demands, therefore advice must be tailored to match the training demands as well as the demands of specific positions within the sport (242). According to F-MARC and ACSM, daily carbohydrate intake in team athlete is 5-10 g / kg and 7-8 g / kg respectively (500-600 g for a standard male athlete) (251,68).

The average daily intake of soccer players in our study is 232,844 g / day. (Table 4.15). In a similar study conducted in Australia, the average daily carbohydrate intake of soccer players was determined as 220 ± 76 g / day (252). Unlike, in a study conducted in Italy in 2015, the average carbohydrate intake was calculated as 429.1 ± 26.2 g / day (51%) and it was found that the daily intake of carbohydrates was higher when compared with our study (247).

The daily average carbohydrate intake of the players participating in this study is 206.85 ± 69.2 (40.79 ± 9.19) in the Super League, 235.49 ± 73.43 (38.9 ± 8.86%) in the TFF 1st League. 241.89 ± 70.45 (40.49 ± 8.75%) in the TFF 2nd League, 240.5 ± 63.37 (45.91 ± 7.52%) in the TFF 3.League and it is 239,49 ± 60,43 (48,16 ± 5,72%) g / day in the Amateur League (Table 4.16). In general, according to the amount of carbohydrate that a Soccer player should take, the intake amount is low in our study. Between the leagues no statistically significant difference was observed in terms of quantity whereas it was observed in terms of percentage (Table 4.17). Unlike this result, in another study conducted on 70 soccer players over the age of 18 in Australia, the amount of avarage carbohydrate consumption per day was found to be 302.4 ± 72.3 g for professional soccer players whereas the average consumption for semi-professional soccer players was 298.7 ± 148.5 g (235). In order to better define and inform the energy requirements of the English Premier League 6 professional soccer players during the season, similiar to this study, 24 hours of food consumption recording was applied to athletes exercising 5 days a week by using reminding method, and as a result, daily carbohydrate taken was 330 ± 98 g. and it was shown to be in 1.4 g / kg level (236). In a review study, carbohydrate intake was determined as 316 ± 70 g for the Spanish 1st league Soccer team, 334 ± 16 g for the 4th league Soccer team; 339 ± 89 g for Italy 1st league Soccer team; and 393 g for England 2nd league Soccer team (249). When the players participating in this study were evaluated in terms of carbohydrates, it was observed that soccer players did not make enough carbohydrate intake in their diets according to other sample studies. However, as the league level decreases, carbohydrate intake increases as in our study. In a study conducted

by Hidalgo et al. in 2015, the share of daily energy of amateur players aged 19 from carbohydrates was found to be 48 ± 0.022% (233). The results of this study were similar to ours.

In our study, the average daily fiber intake of the Super League players is 31.22 ± 10.36 grams which is the highest and the average daily fiber intake of the Amateur League is 21.89 ± 8.75 grams which is the lowest (table 4.16). Amateur league intake level was found to be similar (21.1 ± 2.2 g) in a study conducted with soccer players in Italy in 2015 (247).

As in our study, soccer players included in this study continue to consume diets that do not align with carbohydrate recommendations, intakes on average insufficient when compared to recommendations (68).

Protein is important for muscle protein synthesis, supports recovery processes, promotes satiety and can aid the maintenance of body composition. It also has many other important roles in the body as enzymes, hormones, transporters and antibodies. Athletes with insufficient protein intakes have an increased risk of muscle wasting, illness and injury. ISSN recommendations state that to maintain protein balance athletes should consume 1.4–2.0 $g \cdot kg^{-1} \cdot day^{-1}$of high-quality protein (253). ACSM has identified different protein requirements of 1.6-1.7 g / kg for strength athletes and 1.2-1.4 g / kg for endurance athletes (68). Since the Soccer contains repetitive strength and endurance activities in a 90 minute competition, the protein requirement of soccer players is in the range of 1.4-1.7 g / kg (33).

In our study, daily protein consumption was found to be 110.18 g / day. Similarly, in a study conducted in 2015 in Italy, protein intake was calculated as 115.8 ± 12.0 g (15%) (247). Unlike, in another study conducted in Australia, the daily protein intake of soccer players was 140 ± 35 g which is found to be higher than the result of our study (252).

Avarage protein intake of all players in this study is 1.4 ± 0.28 g / kg. and in Super League it is 107,5±26,2 (21,37±4,3), in TFF 1st League it is 137,96±31,86 (23,25±4,97), in TFF 2nd League it is 128,68±33,46 (21,57±4,27), in TFF 3rd League 94,97±36,08 (17,59±4,5), in Amateur League it is 81,79±29,91 (16,09±4,04) g/day and Most leagues have a statistically significant difference between each other (Table 4.16,table 4.17). In order to better define and inform the energy requirements of the English Premier League 6 professional soccer players during the season, similiar to this study, 24 hours of food consumption recording was applied to athletes exercising 5 days a week by using

reminding method, and the average daily protein intake was found to be 205 ± 30 g (236). According to this sample study, the amount of protein taken daily in our study remains low. In another study conducted in Australia over 70 soccer players over the age of 18, the amount of protein consumption per day was similiarly found to be 152.3 ± 27.7 g for professional soccer players and 149.1 ± 46.8 g for semi-professional soccer players. (235). In a study conducted in Australia, 45 soccer players were divided into experienced (23 soccer players) and inexperienced (22 soccer players), and the daily intake of protein during the season showed that less protein was consumed by inexperienced players (234). In the literature as the league level increases, protein intake increases as seen in our study. It can be said that this increase in league level is due to economic reasons. In a review study, daily protein intake was 111 ± 23 g for the Spanish 1st League Soccer Team and 132.8 ± 6.3 g for the 4th league. The first league Italian Soccer Team received 101 ± 23 g and English 2nd League Soccer Team received 114.4 g (249). The difference in leagues in different countries was not similar to the leagues in our country.

Within the framework of these values, it was shown that the protein intake of the players participating in this study was high as in the other studies in the literature. It is thought that the low carbohydrate intake of the diet is related to the amount of protein taken by diet and protein is the macro nutrient that soccer players give priority.

Dietary advice for the long-term health of athletes should aim to include a varied diet that focuses on total and saturated fat, not to exceed recommendations (total fat <30% total energy and saturated fat <10% total energy) (253).

Nine studies have shown that dietary fat intake exceeds recommendations (242). In our study, depending on the league the average daily fat intake is 90,39 ± 35,8 (37,89 ± 8,96) in the Super League and 106,99 ± 36,27 in the TFF 1st League (37.93 ± 7.04), 105.22 ± 35.14 (38.03 ± 9.11) in the TFF 2nd league, 89.79 ± 30.72 (36.51 ± 6.48) in the TFF 3rd league) and 82.7 ± 25.3 (35.73 ± 4.87) g/day in the Amateur League (Table 4.16). In our study, there was a significant difference in daily fat intake between TFF 1st League and Amateur League, TFF 2nd league and Amateur League, whereas a significant difference was not observed in all league levels (table 4.17). In an other study conducted in Australia over 70 soccer players over the age of 18, the amount of daily fat consumption with 3-day nutrient consumption record was found to be 95.9 ± 31.7 g for professional soccer players and 85.8 ± 37.8 g for semi-professional soccer players. (235). In a study

conducted by Hidalgo et al. in 2015, the share of daily energy from fat was found to be 33 ± 0.004 for amateur players aged 19 (233).

In our study, cholesterol, monounsaturated, polyunsaturated and saturated fatty acid intake were found to be 455.67 ± 259.29g, 30.95 ± 14.23g, 22.06 ± 10.59g, 32.13 ± 12.16g, respectively (Table 4.15); In a study conducted in 2015 in Italy, cholesterol, monounsaturated, polyunsaturated and saturated fatty acid intake were 252.1 ± 12.1g, 52.82 ± 4.41g, 13.67 ± 0.29g, 34.25 ± 5.11g, respectively (247). When this study is compared with our study, cholesterol and polyunsaturated fatty acid were higher and monounsaturated fatty acid was lower in our study. A similar result was found for saturated fatty acids. In a study involving rugby union athletes (n = 35) and soccer players (n = 25), it was found that unsaturated fat intake fell below 10% of the total energy intake of the recommended intake level. Six studies examined cholesterol intake and found that dietary intake of athletes was recommended to exceed <300 mg / day (242) and it was determined that it exceeded the recommended amount. This result is similar to our study.

It is found that the average cholesterol levels was taken as 540.52 ± 256.03 mg in the Super League, 624.87 ± 242.16 mg in TFF 1st League, 592.54 ± 215.18 mg in 2nd League, 413.93 ± 243.24 in TFF 3rd League and 346,42 ± 237.95 mg in Amateur League (Table 4.16). In general, cholesterol was found to be more than the required amount. It is likely that American soccer players consume high cholesterol intakes for their potential body composition goals (to quickly replace the lack for energy intake) (242). In our study, a statistically significant difference was found among leagues in terms of cholesterol uptake and cholesterol value decreases as the league level decreases in all leagues except the Super League (table 4.18).

In our study, a statistically significant difference was observed between Super League and TFF 1.League in terms of saturated fatty acid intake (table 4.18). Tff 1. League soccer players in other leagues than the players of animal origin proteins received more; Therefore, it can be said that the value is high and super league soccer players prefer more plant-derived proteins and that soccer players are fed more accurately. We can say that as the level of the league increases, cholesterol also decreases due to decreasein protein amount. In a study conducted by Hidalgo et al. in 2015, MUFA, PUFA and cholesterol amounts in daily energy levels of amateur soccer players aged 19 were found to be 36.9 ± 2.28, 19.4 ± 1.56, 421.8 ± 28.38 mg / dL, respectively (233). When amateur players in our

study is compared with the ameteur players of this study, it is observed that in our study the soccer players receive less cholesterol and MUFA but more PUFA.

The carbohydrate intake of the soccer players participating in this study was found to be lower than the standard values given by the guidelines, and the fat intake was found to be high accordingly. Although most of the team athletes in this review consume diets that are consistent or exceed dietary fat intake recommendations, it appears that saturated fats (ie, mono and polyunsaturated fats) are of low quality (saturated fat> 10%).

In the study, it was found that the use of vitamins compared to leagues was significant except for vitamin E (Table 4.19). Vitamin A, vitamin B_{12}, vitamin C, vitamin B_2, and vitamin E, which are consumed daily in all leagues, were found to be high in terms of RDA value and amount of use in all leagues. According to the RDA value, it was found that niacin in Amateur League and TFF 3rd league, folic acid in all leagues except Super League and vitamin B_1 in all leagues were found to be low (Figure 4.1). In a study supporting this result, folic acid daily intake level of 21 players was found to be lower than the recommended values (245).

According to the RDA value and usage status, in the Super League vitamin C is consumed at highest level (268.04 - 241.24 ± 170.14%) while same rate changes has been observed in the other leagues (Figure 4.1). At the same time, there was a statistically significant difference between Super League and TFF 1st league, Super League and TFF 3rd League, Super League and Amateur League (table 4.20). This result shows that Super League soccer players have some knowledge to strengthen the immune system and they consume some food (such as fruit) for specific reasons. At the same time, 30 young soccer players in Italy showed a very high vitamin C intake showed the same result as our study (238).

The daily intake of niacin amount was below the limit in Amateur League (77,125 - 12,34 ± 7,2 mg) and 3.League (94,375 - 15,1 ± 8,93%) according to RDA value and usage status. Statistically a significant difference was observed between Super League and TFF 3rd League, Super League and Amateur League, TFF 1st League and TFF 3rd League, TFF 1st League and Amateur League, TFF 2.League and 3.League, TFF 2nd League and Amateur League. It was found that as professionalism increases these results also increase in line. (Table 4.19, Figure 4.1, Table 4.20).

Vitamin B_1 was at full limit in the Super League (100.83 - 1.21 ± 0.43 mg) according to the RDA and amount of use. Folic acid content was lower than the value

required in the other leagues in terms of RDA value and usage amount except Super League (111,49 - 445,94 ± 129,17 mg) While the vitamin B_6 value in Amateur League were at limit according to the RDA value and the amount of use (101.54% - 1.32 ± 0.47 mg), it was observed that the value and the amount of this vitamin increased as the league level increased. (Figure 4.1). A study of 30 young soccer players in Italy shows that folic acid and B_6 intake is low (238).

In a study conducted by Hidalgo et al. In 2015, it was observed that daily micronutrients of amateur soccer players were higher than RDI values except vitamin D. In particular, the intake levels of vitamins B_2, B_6 and B_{12} were found to be very high (233). The results of this study are similar to the results of our study.

Depending on different leagues while amateurism increases, low levels of some vitamins may be associated with decreased diet quality and diet information as the league level decreases. In particular, low niacin, thiamine and folic acid of vitamin B can be associated with dietary quality. This may be the proof of a nutrition with low vegetables and meat simple but a nutrition rich in carbohydrate.

In our study, calcium, sodium, potassium, phosphorus, iron, zinc intake are found to be 722.91 ± 301.52mg, 2655.18 ± 1031.3mg, 1446.05 ± 499.1mg, 13.34 ± 4.33mg, 13.23 ± 4,91mg respectively (233). In a study with soccer players in Italy in 2015, calcium, potassium, phosphorus, iron, zinc intake are found to be 1150.7 ± 128.9mg, 2576.8 ± 52.4mg, 1677.0 ± 98.5, 11.1 ± 1.0, 10, 0 ± 1.1 mg respectively. According to this study, we found that calcium and phosphorus intake was low and potassium, iron and zinc intake were similar. Unlike this study, in a study conducted with 21 soccer players zinc were taken inadequate amounts. In addition, calcium / phosphorus ratio for all players was lower than the recommended values (245).

In all leagues, daily consumption of zinc, iron, phosphorus and potassium is high in terms of RDA and usage amount; whereas magnesium and calcium are low (Figure 4.1). In a study conducted by Hidalgo et al. in 2015, it was observed that micronutrients of amateur soccer players were higher than RDI values except potassium (233). In different leagues, niacin in the Amateur League and TFF 3rd League, magnesium in all leagues except Super League, folic acid in all leagues except Super League, and vitamin B_1 intake in all leagues except Super Leagues were found to be low. In the study, it was observed that the use of minerals compared to leagues was generally statistically significant except calcium. According to the RDA value and usage of zinc, TFF was the highest in the TFF

1st League (16.86 ± 5.13 mg) and the lowest in the Amateur League (11.31 ± 4.41 mg) and there were statistically significant differences (p> 0.05). According to the RDA value and use of iron, it was seen as the highest in the Super League as 15.46 ± 4.63 mg, while the value decreased as the league decreased and 11.76 ± 3.86 mg in the Amateur League. A statistically significant difference was found between the two leagues. According to the RDA value and use of phosphorus, TFF was found to be highest in 1st place and intake value was 1798.69 ± 411.48 mg; amateur league and the intake value was 1205.97 ± 385.45 mg. A statistically significant difference was found between them. Potassium was found in the highest super league according to the RDA and usage conditions and the intake value was 3768,86 ± 1160,78 g; it was found that the value decreased as the league level decreased, and this intake was found to be 2326.77 ± 957.76 mg in the amateur league. There was a statistically significant difference between these two leagues.

In our study, it was found that magnesium was below the value in all leagues except super league according to RDA value and usage status. In the super league, it was seen at the full margin (101.48- 425.91 ± 127.81mg) (Figure 4.1). Calcium was found to be at the same rate without any significant difference in all leagues according to RDA and usage status (Super League is the highest value which is 833,88 ± 283,36mg, amateur league is the lowest lowest value which is 673,76 ± 291,89mg) (Table 4.21). In one study, the players did not follow the general (non-sports-specific) recommendations for calcium (estimated average requirements), indicating that athletes received 83% of EAR (242).

Macro and micronutrient intake of all athletes was consistent in some, but incompatible in some others. The level of minerals and vitamins taken daily increased as the league level increased. This can be attributed to quality and accurate nutrition information. According to amateur soccer players, low zinc, magnesium, calcium are thought to be due to the low importance and consumption of fish, oilseed and dairy products. It should also be remembered that calcium is very low in all leagues.

- **Consumption of Soccer Players in Ergogenic Nutrition**

Both professional and amateur athletes think that nutritional ergogenic products are indispensable to improve athletic performance (254). This was also observed in our study (Table 4.24).

Considering the findings of this study; 73.7% of the athletes use food supplements, whereas 26.3% do not use (Table 4.23). In a study conducted by 778 athletes in the Netherlands, 97.2% of athletes; in a study conducted in 2017 in Spain, 81.3% of tennis

players use nutritional supplements or ergogenic nutritional supplements (255,256). In contrast, in a study conducted in Poland, 48.2% of 600 athletes (216 women, 384 men) interested in various sports; in another study, it was found that less than 30% of 561 Italian athletes used dietary supplements (257,258). In our study, the rates are 85% for Super League, 97.5% for TFF 1st League, 86.7% TFF for 2nd League, 68.8% for TFF 3rd League and 65.0% for amateur league (Table 4.24). The level of use decreases as the level decreases. In the amateur group it was found to be the lowest level.

In amateur leagues, their ergogenic support is that they do not make Soccer as their main profession and do not take care of it professionally. It is thought that it is the group that uses the least because there are products that they cannot reach much due to economic reasons. It is thought that the super league uses less ergogenic nutrients than other leagues, that they are in the best position and do not consider the need to go to a different supplement product, and that their daily foods are better regulated and professionally regulated by dietitian control.

In our study, the use of ergogenic food was recommended by trainers, dieticians and doctors in rates of 35.5%, 19.2% and 18.2% respectively (Table 4.23). In another study, it was determined that soccer players using reinforcements decided to use them voluntarily, by fitness coach, trainer and dietician recommendation in rates of 59.8% 16.5%, 15.8 and % 8.5% respectively (231).

In our study, using ergogenic products is recommended by trainers in the Super League, in the 2nd TFF League, in the 3rd TFF League and in Amateur League in rates of 50.0%, 40.0%, 32.5% and 33.9% respectively. In the TFF 1st League it is recommended by dieticians (40.0%) at most. (Table 4.24). In a study conducted in Spain which tennis players were divided into two groups as Top 100 (T100) and Outside Top 100 (OT100) and, for T100 it is recommended by dieticians (62.5%) at most and for OT100 it is recommended by trainers at most. (256). Considering this result it can be said that the reason why only the TFF 1.League players ask the dietician at most is their target to play in the Super League. However the super league players do not have such a goal and and they think they know many ergogenic products.

In our study, soccer players obtained 42.4% of the nutritional support product from related stores and 16.8% from pharmacies (table 4.9). Similar to this result in a study that

was conducted by Yarar (2010), 46.1% of the athletes obtained nutritional supplements from related stores and 8.4% from pharmacies (259).

In our study, nutritional supplements were provided via internet by the players playing in the super league, while players from other leagues stated that they bought from the relevant stores (Table 4.24). The reason for this result is that the super league players consciously, without the need to ask anyone, better quality and better products are thought to have the purpose of obtaining and possibly from abroad.

In our study, 54.7% of soccer players use ergogenic product to increase performance (Table 4.23). Similar to this result, in a study conducted by 76 clubs and 567 athletes in Canada, 49% of athletes were reported to use ergogenic products to improve overall athletic performance (260).

In our study, considering the cause of taking ergogenic product, only a significant difference was observed between the 3d League and Amateur League (63.8% and 49% respectively) (Table 4.24). Similiar to this result in a study conducted in Spain which tennis players were divided into two groups as Top 100 (T100) and Outside Top 100 (OT100) and, for T100 Recovery between efforts (50,0%) ve Increase energy levels (50%), for OT100 Recovery between efforts (59,4%) have been reached the result of the cause of taking ergogenic product (256). While the money spent by the super league players on the ergogenic product is 1000 TL and above (82.4%), this amount is less in the other leagues (Table 4.24).

In our study, the most commonly used nutritional ergogenic product was found to be vitamin mineral supplements (47.6%) (Table 4.23). In a study conducted with 778 athletes in the Netherlands, 42.9% of athletes were reported to consume multivitamin and mineral preparations (255).

In our study, it was observed that 52.4% of soccer players have not used any supplements, where as 23.7% use vitamin C, 19.7% use magnesium, 17.6% use vitamin B_{12}, 16.1% use vitamin D, 9.2 % use calcium, 5,5% use iron and 2.4% use biotin (Table 4.25). In fact, although vitamin B_{12} and C which players take with nutrients is higher than iron RDA values, players take them as supplements (Figure 4.1). However, calcium and magnesium were found to be low when compared with RDA (Figure 4.1). Therefore, the use of these supplements seems to be correct method. In another study conducted with 76 clubs and 567 athletes in Canada, 66% of the athletes use vitamin C, 48% use vitamin D,

43% use calcium, 32% use B vitamins, 27% use iron and 17% use magnesium (260). The use of these supplements in our study is observed more. This may be an indication that Turkey is a country rich in vitamins due to abundance of fruit and vegetables.

In this research, the use of vitamins and mineral supplements in Super League of professional soccer players is 50%, in TFF 1st League is 67.5% and in TFF 2nd League is 51.7% which are higher than TFF 3rd League (42.5%) and Amateur League soccer players (43.9%). No significant relationship has been found between the players' vitamins or mineral supplements depending on the league (Table 4.25). In the use of vitamin mineral supplement Super League is not at the top. Although the reason for this is seen the correct and balanced nutrition of the super league players, the super league RDA values in our study do not support this situation. Amateur league is not the last place. We can think of this as a situation caused by economic reasons or lack of information. In a differet study conducted in Spain which tennis players were divided into two groups as Top 100 (T100) and Outside Top 100 (OT100), vitamin-mineral suplement usage of T100 and OT100 groups were %50 ve %27.6 respectively (256). In the study conducted by Yarar (2010), it was determined that 55.7% of elite athletes used nutrition support products and 32.8% of those using nutritional support products engaged in team sports (259). In another study similar to this result, more elite athletes used multivitamin / multimineral supplements compared to non-elite athletes (261).

In our study, considering iron intake depending on the league it was found to be 15% in TFF 1st League and 2.5% in 3rd League. Similar to this result in Spain which tennis players were divided into two groups as Top 100 (T100) and Outside Top 100 (OT100), iron intake of T100 and OT100 groups were %62,5ve %6,3respectively (256).

When the daily micronutrients taken with the nutrients are compared with supplements used by soccer players, as a result of RDA values, intake of vitamin C, vitamin B_{12} and iron as a supplement is not necessary; however calcium and magnesium intake as a supplement can be said as the correct method for soccer players (Table 1.5).

TFF 2nd League, which is the highest in daily use of vitamin B_{12} taken with nutrients, is in the 2nd place in the supplement usage (18%). Although the highest level of vitamin C taken with daily foods is in the Super League, 20% of Super League soccer players use vitamin C supplement. While the daily intake of calcium of all players is low, only 9.2% of players need supplements. We can say that the magnesium level taken with

daily foods is the highest in the Super league while Super League RDA values are below all other leagues RDA values (Table 4.25). In the amateur league, magnesium intake with daily foods is the lowest group (248.89 ± 101.18 mg), while supplementation is also the lowest group (10.0%).

In a study conducted in the USA, the prevalence of vitamin D deficiency was found to be 3% in the winter months of a mixed group consisting of outdoor sportsman including soccer players as well (262). In another study, I think that it is beneficial to take this vitamin as a supplement because of the lack of vitamin D in soccer players (233). The dose of vitamin D should be determined based on clinical considerations.

In this case, the groups most in need of daily vitamin-mineral supplementation in the leagues are not supported with supplements.

In our study, it was observed that 41.6% of the players consume sports drinks every day. Three studies with similiar results have been conducted with 778 athletes in the Netherlands, 600 sportsmen (216 women, 384 men) in various sports in Poland and by İlhan et al.,with amateur and professional soccer players in Samsun province and it was reported that 44.1%, 41.2% and 38.4% of athletes drink sports drinks respectively. (255,257). In a study conducted in 2017, when the sports drinks consumption status of the 88 National Collegiate Athletic Association (NCAA) Division III (DIII) soccer players group was examined, unlike other studies it was found that 95,5% consumed energy drinks and 34% out of 95,5% consumed everyday (237).

In our study, while Super League consumption is 80.0% on average, this ratio is observed to decrease as the level of league decreases. In the amateur league, the average consumption is observed as 29.4%. In a differet study conducted in Spain which tennis players were divided into two groups as Top 100 (T100) and Outside Top 100 (OT100), sports drink usage of T100 and OT100 groups were %87.5 ve %81.0 g respectively (256). As a result of this study, while the results between the two groups had no significance, a significant difference was found in our study.

I think that sports drinks should be consciously consumed within the required value range which gives positive results especially for soccer players, and therefore I think that consumption should be provided in other leagues as well as Super League in which sports drinks are consciously consumed.

Energy drink consumption has a positive effect on these athletes, especially for performance reasons such as increasing energy and muscle mass / strength (263).

In our study, 41.6% of soccer players consumed energy drinks once a week (Table 4,27,Table 4.28). In a study conducted in 2017, %47.1 of the group formed by 88 National Collegiate Athletic Association (NCAA) Division III (DIII) soccer players consumed energy drinksvery rarely (less than once a month) (237).

In our study, while the protein bar consumption of all soccer players is 9,5%, in the leagues, it is found to be 10% in Super League, 25% in TFF 1st League, 11.7% in 2nd League, 6% in 3rd League and 6.7% in the Amateur League (Table 4.26,Table 4.27). Unlike these results, in a study which was conducted in Poland, 3.7% of 600 athletes in various sports use protein bars and the results were lower than in our study (257).

Creatıne supplement is claimed to have a contribution to muscle mass, muscle strength, endurance and general athletic performance (187). Creatine, probably one of the best known nutritional aids to enhance performance of high-intensity exercise, has convincingly substantiated its ergogenic potential (143). However, in our study, it was found that only 18.7% of football players recognized creatinine (Table 4.26). and its consumption rate is %2,1. When the frequency of creatine intake was examined, there was no statistically significant difference among league levels and consumption frequency was observed as once a week. In a study conducted in 76 clubs and 567 athletes in Canada similar to our study, the least used ergogenic support was found to be creatine (260). In a study that was conducted by Yarar in 2010, 14.5% of the athletes and in Poland, 34.5% of 600 sportsmen (216 women, 384 men) who are interested in various sports consume creatine (259,257). In a study conducted in 2017, when the creatine consumption status of the 88 National Collegiate Athletic Association (NCAA) Division III (DIII) soccer players group was examined, it was found that 39.8% consumed very rarely (less than once a month) (237).

In our study, creatine consumption was 1.7% in Amateur League and 6.7% in TFF Second League. As it is known that age decreases as the league level decreases,. Unlike this study, the percentage of young and advanced age athletes using creatine in a group of 600 athletes in various sports in Poland is 2.6% and 2.4%, respectively (257).

In our study, the daily creatine intake of soccer players is 5,11 g while intake amount according to the leagues is 4 g in TFF 2nd league, 5g in TFF 3rd League and 6.7 g

in Amateur League. The amount of creatine to be taken to improve performance in Soccer should be 0.3 g / kg / day, 4-7 days (4-day intake) + 0.04-0.07 g / kg (1-month intake) (264).

Many studies on creatine include studies based on creatine loading phase. We found that the players in our study used creatine in low amounts and once a week, and as a result we can conclude that consumption is made according to the conservation phase instead of the loading phase.

In our study, the average electrolyte tablet or gel use is 15% in the Super League and 2.2% in the Amateur League. The significant difference between these leagues is thought to be due to the support product knowledge of the player. The use of supplements such as sports/electrolyte drinks and sports gums/gels is claimed to be among the motivations based on performance and has a health promotion role (265).

In addition to the benefit of Omega-3 fatty acids, which increases the distribution of red blood cells by decreasing viscosity, the excessive consumption of n-3 has been shown to have positive effects on blood clotting (4).

In our study, the highest consumption is in TFF1st League (42.5%) while the lowest consumption is in the amateur league and a statistically significant difference is observed (3.3%).

In our study, the amount of amino acid use by athletes was found to be 3.7% whereas 25.8% in the study conducted by Yarar (259).

In our study, the percentage of BCAA use by soccer players is 7.9 (Table 4.26). It is most commonly used in TFF 1st League (32.5%) whereas amateur league is the least user (1.1%). In a study, it was reported that individuals using BCAA of 14 g / day during 8 weeks of strength exercise significantly gained a rise in terms of body weight and muscle mass when compared to individuals using whey protein (266). In our study, however, BCAA intake is 5 g which is lower than whey protein intake (Table 4.28).

Whey protein alone has been shown to provide less benefit than ingestion with creatine. When taken with creatine, the effect on maximal strength and lean body mass is more significant (267). In a study conducted by Kerksick et al. (2006), in male athletes doing strength trainings who take whey and casein combination group, a greater increase

was obtained in lean mass and performance compared to other ergogenic product groups (253).

It was seen that 11.1% of the players in our study used whey protein every day (Table 4.26, Table 4.28). In a study conducted with people coming for exercise to a fitness center in Seville, the use of protein was found to be 28% (268). Similarly, in the study conducted by Yarar, 36.0% of athletes used protein powder (259). In a study conducted in 2017 with similar results, it was found that 85.2% consumed as daily in the group formed by 88 National Collegiate Athletic Association (NCAA) soccer players (237).

In our study considering the use of whey protein by soccer players in different leagues, whey protein is not used in Super League whereas it is used by a rate of 52.5% in TFF 1st League, 18.3% in TFF 2nd League, 6.3% in TFF 3rd League and 2.8% in Amateur League (Table 4.27). In our study, the reason why whey protein was never used by soccer players in the Super League may be the thought that the proteins taken with food are high quality and sufficient. The reason why the highest amount of whey protein is used in the TFF1.League is that soccer players can target the Super League and see this product as a tool to achieve this goal.. In another study, 38.9% of 185 semi-professional soccer players think the use of protein supplements is necessary (269).

The daily intake of whey protein is not significant among the leagues whereas average intake amount is 30 g/day (Table 4.29). In a 6-week study, 20 g whey protein intake increased arm muscle mass (270).

The amount of bicarbonate to be taken to improve performance in Soccer is recommended as 0.3 g/kg which should be 60-180 minutes prior the training (264). In our study, the intake amount was found to be 0.06g / kg which was observed to be significantly lower than the recommended amount.

In our study, average caffeine intake according to leagues is 15.0% for Super League, 47.5% for TFF 1.League, 30% for TFF 2.League, 11.3% for TFF 3.League and 3.3% for Amateur League. In another study, the percentage of young and older athletes using caffeine out of 600 athletes interested in various sports in Poland is 8.5% and 15.4%, respectively (257). These results are in parallel with the results of our study. Similar to these results, in a study conducted in Spain which tennis players were divided into two groups as Top 100 (T100) and Outside Top 100 (OT100), caffeine usage of T100 and OT100 groups were 50% and 11.1% respectively (256).

While there was no significant difference in the amount of caffeine intake between Soccer leagues, daily intake was found to be 1.3 mg / kg. In a study, it is recommended to take 3-6 mg / kg caffeine 1 hour before exercise (264). The amount of caffeine use in these results was found to be higher than the amount in our study. The players in our study should be informed about the caffeine intake dosage because they consume much less caffeine than they should.

The amount of L-carnitine use in soccer players in our study is not statistically significant and is usually about 3g/day (Table 4.29). 12-week L-carnitine supplementation (2 g / day in divided doses) has been shown to increase plasma carnitine levels by 20 ~% in meat consumers and 30 ~% in vegetarians (192).

While the average calorie intake of all soccer players was sLeaguehtly lower than the predicted value, the macro and micronutrient intake was partially consistent with the relevant rules. Taking into account the daily nutrients of all players, it would be appropriate to limit the intake of protein and fat to a certain extent and to take in micronutrient rich in complex carbohydrates and in line with the threshold value in order to improve nutritional knowledge and dietary practices.

Generally, many studies about soccer players have been conducted with professional and amateurs. However, this study is not only based on being professional or amateur. It was also tried to determine whether there were significant differences between the leagues. Results showed significant differences between leagues for many parameters.

It was seen in our study that the nutritional status of soccer players varies widely according to different leagues. Generally as the league level decreases (Super League, TFF 1st League, TFF 2nd League, TFF 3rd League, Amateur League), a decrease was was also observed in nutrition, energy and nutrient intake which soccer players consume daily. It was observed that soccer players many micronutrients intake is lacking and they depend on ergogenic food usage more than necessary and they overuse it.

Almost all soccer players have used nutritional supplements. The most commonly used nutritional ergogenic support in soccer players is vitamin-mineral supplements. In the study, the knowledge and use of nutritional ergogenic products decrease as the level of league (Super League, TFF 1st.League, TFF 2nd League, TFF 3rd League, Amateur League) decreases. In particular, the amount and frequency of sports drink consumption, whey protein consumption frequency, glutamine consumption frequency and amount, the

amount of protein bar consumption are taken into consideration, a statistical significance appears. There is no statistical significance in the frequency and amount of consumption of other ergogenic foods.

In general, it is observed that the amateur league nutrition is lower quality than other leagues. However, it is also observed that that those who use dietary ergogenic support consciously or unintentionally consume the amount in accordance with international guidelines. As the league level increases, age of players also increase and nutrition-related training and initiatives become more important for young players. When this study is compared with other studies, it is seen that soccer players need scientific education for nutrition and consumption of ergogenic support. In our study, it is seen that soccer players consult trainers more than dietitians or health experts. It is clear that scientific-based dietician orientation will contribute to the development of our country in this field by developing Turkish football and Turkish Football Players in a professional manner.

The importance given to amateur soccer players can provide the development of the Soccer sector in our country. Therefore, all teams affiliated to the TFF should be institutionalized and managed in a professional manner with the same care, regardless of leagues. It is important that the infrastructure is meticulously provided. We hope that this study will be a guide for future research on nutrition and nutritional ergogenic support of all professional and amateur soccer players.

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7. APPENDICES

7.1. Survey

Değerli katılımcı

Yeditepe Üniversitesi öğretim üyesi Prof. Dr. Serdar Öztezcan tarafından yürütülen, Yeditepe Üniversitesi Klinik Uygulamalar Etik Kurulları'nın sayılı onayı ile izin verilen ***"Farklı Liglerde Oynayan Futbolcuların Beslenme ve Besinsel Ergojenik Destek Kullanım Durumunun Saptanması"*** *başlıklı araştırmaya katılımınız rica olunmaktadır.*

Bu araştırmaya tamamen kendi iradenizle, herhangi bir zorlama veya mecburiyet olmadan gönüllü olarak katılımınız esastır. Lütfen aşağıdaki bilgileri okuyunuz ve katılmaya karar vermeden önce anlamadığınız herhangi bir husus varsa çekinmeden sorunuz.

Futbolcularda beslenme, antropometrik, biyokimyasal, sosyo-kültürel özelliklerine göre farklılık göstermektedir. Sporcunun performansını ise en çok genetik yatkınlık, antrenman, beslenme etkiler. Sporcular; performanslarını arttırmak, daha kuvvetli, daha hızlı ve dayanıklı olmak için sürekli arayış içindedirler. Çoğu da hiç uğraşmadan bu amaçlarına ulaşmak için; bilinçsizce ilaç, yasaklı madde, yiyecek ve besin destek ürünleri kullanarak mucizevî bir şekilde performanslarını arttırabileceklerini düşünmektedirler. Besin desteklerin pozitif etkilerinin yanında. negatif etkileri olabileceği pek az sporcu tarafından dikkate alınmaktadır. Potansiyel negatif bulgular; performansta düşüş, sağlığa akut ya da uzun dönemli zarar sonuçları içermektedir. Bu çalışma, futbolcuların beslenme durumunun ve son yıllarda kullanımı giderek artan beslenme destek ürünleri kullanımı, kullanım sıklığı, kullanım amaçları, kullanım bilinci ve bilinç düzeylerinin araştırılması ,farklı liglerde sporcu olma durumlarına göre farklılıkların incelenmesi amacı taşır. Elde edilecek bilgiler ışığında futbolcuların liglere göre beslenme konusundaki eğitim ihtiyaçların belirlenmesi ve besinsel ergojenik destek ürünlerinin bilinçsiz kullanımı sonucu oluşabilecek olumsuzlukların önlenmesi sağlanabilir. Bu yönüyle araştırmanın önemli olduğu düşünülmektedir.

Araştırmaya gönüllü olarak katıldığınızda Soru formunu, Besin Tüketim Kaydı formunu, Besinsel Ergojenik Destek Tüketim Sıklığı Formunu doldurmanız gerekmektedir. Anket formu dışında vücut bütünlüğünüzü tehlikeye sokacak herhangi bir fiziksel müdahale bulunmamaktadır. Soruları eksiksiz olarak yanıtlamanız sonuçların güvenilirliği açısından son derece önemlidir.

Bu formu onaylayarak imzaladığınız takdirde anketteki sorulara vereceğiniz yanıtlar araştırmacılar tarafından değerlendirilecek olup izleyiciler, etik kurul ve kurum haricinde 3. kişilerle paylaşılmayacaktır ve kişisel bilgileriniz gizli tutulacaktır. Bu çalışmanın içinde olmak isteyip istemediğinize tamamen kendi iradenizle ve etki altında kalmadan karar

vermeniz önemlidir. Katılmaya karar verdikten sonra, herhangi bir anda sahip olduğunuz herhangi bir hakkı kaybetmeden veya herhangi bir yaptırıma maruz kalmadan istediğiniz zaman ayrılabilirsiniz.

Bilgilendirilmiş Gönüllü Olur Formunda yapılan tüm açıklamaları okudum ve anladım. Konusu ve amacı yukarıda belirtilen araştırma hakkında bilgilendirme yapılarak dilediğim zaman gönüllü olarak katıldığım bu araştırmadan ayrılabilme hakkına sahip olduğum bilgisi sözlü ve yazılı olarak aşağıda adı geçen araştırmacı tarafından yapıldı. Dilediğim zaman ayrılma hakkım saklı kalmak koşulu ile hiçbir baskı ve zorlama olmaksızın bu araştırmaya katılmayı kendi rızamla onaylıyorum.

_____

Katılımcı Adı-Soyadı

_____ _____

Katılımcı İmzası Tarih

_____

Araştırmacı Adı-Soyadı

_____ _____

Araştırmacının İmzası Tarih

FARKLI LİGLERDE OYNAYAN FUTBOLCULARIN BESLENME VE BESİNSEL ERGOJENİK DESTEK KULLANIM DURUMUNUN SAPTANMASI VERİ TOPLAMA FORMU

ANKET
Anket No: .....
A-SORULAR
a. Genel Bilgi Soruları
1. Yaşınız : …….. yıl
2. Boy uzunluğunuz : …….. cm 3. Vücut Ağırlığınız : …….. kg
4. Medeni Durumunuz : ☐ Evli ☐ Bekar
5. Eğitim Durumunuz :
☐ İlköğretim (ilkokul-ortaokul) mezunu ☐ Ortaöğretim (lise) mezunu ☐ Üniversite mezunu
6. AMATÖR ☐ PROFESYONEL ☐
7. Hangi ligde oynuyorsunuz? ……
8. Oynadığınız kulübün adı : .....
9. Futbolda mevki (pozisyon) yeriniz : ……..
10. Haftada toplam kaç gün antrenman yapıyorsunuz? . . . . . gün
11. Genellikle günde kaç saat antrenman yapıyorsunuz? ..... saat
B. Beslenme Durumu Soruları
1. Sizce yeterli ve dengeli besleniyor musunuz?
☐ Evet ☐ Hayır ☐ Bazen
2. Beslenmenizi bir program dahilinde mi yapıyorsunuz? (Cevabınız hayır ise 4.soruya geçiniz)
☐ Evet ☐ Hayır
3. Beslenme programınızı kim hazırlıyor?
☐ Antrenör ☐ Kulüp doktoru ☐ Diyetisyen
☐ Arkadaş ve çevre ☐ Yazılı ve görsel medya ☐ Kitap ve benzeri
4.Kulübünüzde diyetisyen bulunuyor mu? ☐ Evet ☐ Hayır
5. Beslenme alışkanlığınızın aktif spora başladıktan sonra değiştiğini düşünüyor musunuz?
☐ Evet ☐ Hayır
6. Sizce beslenme ile başarı arasındaki ilişki nasıldır?
☐ İlişki yoktur ☐ Çok yakından ilişkilidir ☐ Bilgim yok
7. Öğün atlama alışkanlığınız var mı?
☐ Evet ☐ Bazen ☐ Hayır
8. Cevabınız evet veya bazen ise öğün atlama nedeniniz nedir?
☐ Zamanım olmuyor ☐ Fazla geliyor ☐ Yemek seçtiğim için
☐ İştahsızım ☐ Zayıflamak istiyorum ☐ Diğer: ……
9. Ana ve ara öğünleri aşağıda belirtilen zaman aralıklarında düzenli olarak tükettiklerinizi işaretleyiniz.

Kahvaltı	07:00-09:00 arası	☐ evet	☐ hayır
Ara öğün	10:00-11:00 arası	☐ evet	☐ hayır
Öğle	12:00-14:00 arası	☐ evet	☐ hayır
Ara öğün	16:00-17:00 arası	☐ evet	☐ hayır
Akşam	18:00-20:00 arası	☐ evet	☐ hayır
Ara öğün	22:00	☐ evet	☐ hayır

10. Sabah kahvaltısında genellikle ne tür besinleri tercih ediyorsunuz? (tek seçenek işaretleyiniz)

A. Çay, peynir, zeytin, yumurta vb. besinler ☐
B. Çay, poğaça, tost, simit vb. besinler ☐
C. Sadece içecek (Çay, kahve vb.) ☐
D. Süt ile birlikte tahıl gevreği ☐
E. Diğer(belirtiniz) ……..

11. Günlük ortalama kaç litre su içersiniz?
☐ 0,5-1litre ☐ 2-4 litre ☐ 1-2 litre ☐ 5 litre ve üzeri
12. Alkol Kullanıyor musunuz? ☐ Evet ☐ Hayır
13. Sigara kullanıyor musunuz? ☐ Evet ☐ Hayır
14. Antrenman/maç günlerinde beslenmenize normal günlerden farklı bir diyet uygular mısınız?
☐ Evet ☐ Hayır
15. En son yemeği antrenmandan/maçtan kaç saat önce tüketirsiniz? ☐ 1-2 saat önce ☐ 3-4 saat önce
16. Antrenman veya maç öncesi beslenmenizde ne gibi uygulamalar yaparsınız?
☐ Hiçbir değişiklik yapmam.
☐ Protein ağırlıklı beslenirim. (Et, süt, yoğurt,.....)
☐ Karbonhidrat ağırlıklı beslenirim. (Ekmek, tahıl, hamurlu besinler, şekerli besinler,.....)
☐ Yağ ağırlıklı beslenirim. (Kızartmalar,.....)
☐ Protein + Karbonhidrat ağırlıklı beslenirim.
17. Antrenman veya maç esnasında sıvı ihtiyacınızı daha çok hangi içecekle karşılarsınız?
☐ Su ☐ Kolalı içecek ☐ Meyve suyu ☐ Protein tozu
☐ Maden suyu ☐ Tuzlu ayran ☐ Sporcu içeceği ☐ Diğer……
18. Antrenman ve maç anında veya devre aralarında beslenmenizde en sık yaptığınız uygulama aşağıdakilerden hangisidir?
☐ Bir şey yemem ve içmem ☐ Bol su içerim ☐ Meyve suyu içerim
☐ Limonata içerim ☐ Spor barı tüketirim ☐ Spor jelleri tüketirim
☐ Kola, gazoz içerim ☐ Enerji içeceği içerim ☐ Spor içeceği içerim
☐ Çay kahve içerim ☐ Diğer ……
19. Antrenmandan/maçtan kaç saat sonra yemek yersiniz? ☐ 0-1 saat ☐ 2-3 saat
20. Antrenman veya maç sonrası beslenmenizde en çok yaptığınız uygulama aşağıdakilerden hangisidir?
☐ Öğün zamanımı bekleyerek hazırda hangi besin varsa onu tüketirim
☐ Bol su içerim
☐ Meyve suyu içerim
☐ Meyve yerim
☐ Spor içeceği içerim
☐ Karbonhidrattan zengin besinler tüketirim

c.Ergojenik Beslenme Durumu Soruları
1.Ergojenik destek (beslenme destek ürünü/ürünleri) kullanıyor musunuz? (Cevabınız hayır ise 6.soruya geçiniz)
☐ Evet ☐ Hayır

2.Kullandığınız beslenme destek ürünü/ürünlerini kim önerdi? ……
3.Bu ürünleri hangi dönemde kullanıyorsunuz?

☐ Sezon dışı dönem ☐ Antrenman dönemi ☐ Müsabaka dönemi

4. Beslenme destek ürünlerini genellikle nereden satın alırsınız?

☐ İlgili mağazalardan ☐ eczanelerden ☐ İnternetten

5. Beslenme destek ürünlerine yıllık ne kadar harcama yaparsınız?

☐ 0-500 TL ☐ 500-1000TL ☐ 1000TL ve üzeri

6. Beslenme destek ürünleri konusunda bilginiz var mı?

☐ Evet ☐ Hayır ☐ Yeterli düzeyde değil

7.Eğer cevabınız "evet" ise bu bilgileri nereden öğrendiniz?

☐ Antrenörümden ☐ Kitap, gazete ve dergilerden
☐ Derslerden ☐ Radyo ve Televizyondan
☐ Diyetisyenden ☐ Eski sporculardan
☐ Konferans, seminer gibi bilimsel faaliyetlerden ☐ Doktordan

8. Sizce beslenme destek ürünü kullanım amacı nedir?

☐ Zindelik ☐ Yaşlanmayı önleme ☐ Bağışıklığı artırmak
☐ Performans arttırma ☐ Rahatlama ☐ Kanseri önleme
☐ Zayıflama ☐ Kas kütlemi artırmak ☐ Diğer……

9. Beslenme destek ürünlerini kullanım konusundaki düşünceleriniz nelerdir?

☐ Faydası olduğunu düşünüyorum ☐ Zararı olduğunu düşünüyorum
☐ Bazen faydası olduğunu düşünüyorum ☐ Bilmiyorum
☐ Hiçbir olumlu etkisi olduğunu düşünmüyorum

10. Herhangi bir vitamin veya mineral takviyesi kullanıyor musunuz? ☐ Evet ☐ Hayır

11. Cevabınız evet ise hangi vitamin veya mineral takviyesi kullanıyorsunuz? (Birden fazla şık işaretleyebilirsiniz)

☐ B_{12} vitamini ☐ D vitamini ☐ C vitamini ☐ Biotin
☐ kalsiyum ☐ magnezyum ☐ demir ☐ Diğer……..

B- BESİN TÜKETİM KAYIT FORMU

Dün sabah uyandıktan sonra başlamak üzere son gün akşam yatıncaya kadar geçen günlük süre içinde yediğiniz, içtiğiniz her şey (su dahil) öğünlere göre ayrılmış bölümlere yazılacaktır.

Formu doldururken yemeklerin adını lütfen açık olarak yazınız. Örneğin; kıymalı ıspanak yemeği, zeytinyağlı biber dolma, kıymalı yufka böreği, gibi.

Yazılan besin veya yemeklerin karşısına ya ölçü olarak, ya da biliniyorsa gram olarak miktar belirtiniz.

Ölçü belirtirken; ince dilim, kalın dilim, su bardağı, çay bardağı, yemek kaşığı, çay kaşığı, tatlı kaşığı, orta boy, küçük boy, kibrit kutusu, 1 köfte büyüklüğünde et, vb gibi .. besinlerin miktarlarınız yazınız. (İçeceklere eklenen Şeker miktarlarını da belirtiniz).

NOT: Besin tüketim kayıt formunu antrenman gününe denk gelecek şekilde doldurunuz.

ÖRNEK:

ÖĞÜNLER	TÜKETİLEN BESİNLER / YEMEKLER VE İÇECEKLER	MİKTAR
KUŞLUK (ARA ÖĞÜN)	1 kutu kola Peynirli sandviç	3 ince dilim ekmek büyüklüğünde ekmek,2 köfte
ÖĞLE	1 kase domates çorba) 1 kase salata	kaşarlı, ayçiçek yağı ile yapılmış) (1 adet domates,3 yaprak marul,1 adet yeşil biber, 1 tatlı kaşığı zeytinyağı

BESİN TÜKETİM KAYIT FORMU

ÖĞÜNLER	TÜKETİLEN BESİNLER/YEMEKLER VE İÇECEKLER	MİKTAR
SABAH		
KUŞLUK (ARA ÖĞÜN)		
ÖĞLE		
İKİNDİ (ARA ÖĞÜN)		
AKŞAM		

GECE (ARA ÖĞÜN)		

C - BESİNSEL ERGOJENİK DESTEĞİ BİLGİSİ VE TÜKETİM SIKLIĞI TABLOSU

Aşağıdaki tablo beslenme destek ürünü bilginiz ve tüketim sıklığınızla ilgilidir. Ürünleri biliyorsanız ve hangi ürünü ne sıklıkla (her gün/günde/haftada/ayda) tüketiyorsanız gerekli kutucuğa (X) işaret koyunuz ve son olarak tükettiğiniz ürünün miktarını yazınız.

BESLENME DESTEK ÜRÜNLERİ	BİLİYOR MUSUNUZ		TÜKETİYOR MUSUNUZ		TÜKETİM SIKLIĞI										BİR SEFERDE NE MİKTARDA TÜKETİRSİNİZ?
						Günde			Haftada				Ayda		
	EVET	HAYIR	EVET	HAYIR	Her gün	1 Kez	2 Kez	3 ve daha fazla	1 kez	2 kez	3-4 kez	5-6 kez	1 kez	2-3 kez	
Polen															
Sporcu İçecekleri															
Enerji içecekleri															
Sodyum/elektrolit tabletleri															
Omega-3															

BESLENME DESTEK ÜRÜNLERİ	BİLİYOR MUSUNUZ		TÜKETİYOR MUSUNUZ		TÜKETİM SIKLIĞI										BİR SEFERDE NE MİKTARDA TÜKETİRSİNİZ?
						Günde			Haftada				Ayda		
	EVET	HAYIR	EVET	HAYIR	Her gün	1 Kez	2 Kez	3 ve daha fazla	1 kez	2 kez	3-4 kez	5-6 kez	1 kez	2-3 kez	
Protein tozları (whey protein)															
Amino asitler															
Glutamin															
Protein bar															
Spor jelleri															
Linoleik Asit (CLA)															
L- karnitin															
Kreatin															
Kafein															
Bikarbonat															
BCAA															
Antioksidanlar															
Coenzim(CoQ_{10})															

_____

Katılımcı İmzası

_____

7.2. Ethics Committee Approval Certificate

T.C. YEDİTEPE ÜNİVERSİTESİ

Sayı : 37068608-6100-15- 1610 **14/02/2019**
Konu: Klinik Araştırmalar
Etik kurul Başvurusu hk.

İlgili Makama (Yağmur Sözeri)

Yeditepe Üniversitesi Tıp Fakültesi Biyokimya ve Klinik Biyokimya Anabilim Dalı Prof. Dr. Serdar Öztezcan'ın sorumlu olduğu **"Farklı Liglerde Oynayan Futbolcuların Beslenme ve Besinsel Ergojenik Destek Kullanım Durumunun Saptanması"** isimli araştırma projesine ait Klinik Araştırmalar Etik Kurulu (KAEK) Başvuru Dosyası (**1580** kayıt Numaralı KAEK Başvuru Dosyası), Yeditepe Üniversitesi Klinik Araştırmalar Etik Kurulu tarafından **13.02.2019** tarihli toplantıda incelenmiştir.

Kurul tarafından yapılan inceleme sonucu, yukarıdaki isimi belirtilen çalışmanın yapılmasının etik ve bilimsel açıdan uygun olduğuna karar verilmiştir (**KAEK Karar No: 962**).

Prof. Dr. Turgay ÇELİK
Yeditepe Üniversitesi
Klinik Araştırmalar Etik Kurulu Başkanı

Yeditepe Üniversitesi 26 Ağustos Yerleşimi, İnönü Mahallesi Kayışdağı Caddesi 34755 Ataşehir / İstanbul
T. 0216 578 00 00 www.yeditepe.edu.tr F. 0216 578 02 99

7.3. Curriculum Vitae

Kişisel Bilgiler

Adı	Yağmur	**Soyadı**	SÖZERİ
Doğum Yeri	ALTINDAĞ - ANKARA	**Doğum Tarihi**	27.05.1994
Uyruğu	T.C.	**TC Kimlik No**	10018181134
E-mail	dyt.yagmursozeri@gmail.com	**Tel**	05302372705

Öğrenim Durumu

Derece	Alan	Mezun Olduğu Kurumun Adı	Mezuniyet Yılı
Doktora			
Yüksek Lisans			
Lisans	Beslenme ve Diyetetik	**Bahçeşehir Üniversitesi**	2016
Lise	Fen Bilimleri	**Vehbi Koç Vakfı Lisesi**	2012

Bildiği Yabancı Dilleri	Yabancı Dil Sınav Notu (#)
İngilizce (ileri seviye)	-
Almanca (başlangıç seviye)	-

İş Deneyimi (Sondan geçmişe doğru sıralayın)

Görevi	Kurum	Süre (Yıl - Yıl)
Kurucu Diyetisyen	Reyn Diyet ve Beslenme Danışmanlığı L.T.D.Ş.T.İ.	2018(Devam Ediyor)
Sporcu Diyetisyeni	Ümraniye Spor Kulübü	2017-2018

Bilgisayar Bilgisi

Program	Kullanma becerisi
Microsoft Office Programları	İYİ
BEBIS, SPSS	İYİ
ADOBE İLLUSTRATOR	İYİ