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The Importance of Olive in Athletes

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Abstract

Olive has many important pharmacological activities such as anticancer, hypoglycemic, hypocholesterolemic, anti-inflammatory and anticancer because of its phenolic compound content. Due to its importance, it is grown in many regions, especially in the Mediterranean region, and studies on it are continued. In addition, olives are important components in the daily diet of a large part of the world's population. Nutrition is an important part of the preparation of active people and athletes for exercise. Athlete nutrition, on the other hand, is a special nutrition program prepared for the development of both the training of the athletes and their athletic performance during the competition, according to the sports branch they are doing. It is very important to include foods with important pharmacological activities that will also benefit the athlete's activities in this nutrition program. In this study, antioxidant activity studies were carried out on olive leaves, which were collected from Ödemiş, İzmir and dried under suitable conditions. Accordingly, DPPH and ABTS capacities and total phenolic content that supports these activities were determined. As a result of the experiments, the EC_{50} value for the DPPH capacity of the olive leaf extract used in the study was determined as 16,774 ± 0.25 µg/mL, the ABTS capacity was determined as 73.625 ± 0.49 µmol/g and the total phenolic content was determined as 39.26 ± 1.12 mg gallic acid equivalent / g. With this study, which will also contribute to the literature studies, the importance of olive in the sports nutrition program has been emphasized.

Key Words: Olive, athletes, sports, antioxidant

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1. INTRODUCTION

One of the most important crops in Mediterranean countries is olive (*Olea europaea* L.). Approximately 98% of olive trees, which are widely grown worldwide, are located in the Mediterranean basin. *Olea europaea* L. has been widely studied for its importance and place in nutrition. In addition, the fruits and oil of olives are important components in the daily diet of a large part of the world's population (Peralbo-Molina and Castro, 2013). Olive is a food that has been consumed for a long time to benefit from its flavor and therapeutic effects. In our country, the main agricultural area of olive trees is known as the Aegean region. Olive leaves always maintain their popularity due to their bioactive sources such as phenolic and flavonoid compounds detected in their content. It is reported that the amount of olive leaves discarded as a food by-product and accumulated annually from industries may exceed 1 million tons (Lama-Muñoz et al., 2019).

Whether they are wastes from olive oil production or olive leaves that can be considered as medicinal plants, they all contain many phenolic compounds. The most common ones can be listed as oleuropeosides, flavonols, flavones, flavans, catechins and iridoids (Putnik et al., 2018; Giacometti et al., 2018; Wang et al., 2021).

Athletes take the lead in proper health and nutrition, recognizing the importance of balance between our food, mind and body. At a time when we place more and more emphasis on food as a way to gain and maintain health, we find ourselves returning to our roots. Our ancestors were great athletes who performed without modern food technology and used natural food sources. Olive oil, one of these foods, has not changed for thousands of years and continues to be as beneficial as ever for today's athlete. It is no accident that the athletes who won the first Olympic games were crowned with olive wreaths. Olive oil and the athlete share a rich and famous history. Olive oil, used to lubricate the athletes' bodies before exercise and games, was also the prize for victory. Olive oil was revered by the ancients who understood the depth of its value, and today's athletes have rediscovered this wisdom and are putting it into practice (Capling et al., 2021).

Fats are very important for an athlete, but of course the type of fat is also important. Fats can be saturated, polyunsaturated, monounsaturated and trans fat. Olive oil consists of monounsaturated fatty acids, mostly in the form of oleic acid, a few saturated fats, and some polyunsaturated fats such as linoleic acid. Olive oil plays an important role in improving exercise, which is critical for athletic performance. Because only at rest the effects of training come into play. During recovery, the athlete's muscles are repaired in response to the breakdown of muscle tissue, muscle depletion, rebuilding energy stores and fluid loss caused by exercise, and getting stronger. Its omega-3-rich monounsaturated fats produce anti-inflammatory substances that reduce inflammation, as well as a powerful center of polyphenols, which also play a role in preventing bone loss. Studies have shown that olive oil and olive leaf extracts have anti-inflammatory effects (Vogel et al., 2015; Lee et al., 2015; Nsir et al., 2017).

Fats are also vital for the development, repair and building of bone density, which prevents and protects against fracture and injury. In particular, olive oil has an ideal structure for bone health,

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thanks to its unique combination of oleic acids and polyunsaturated fatty acids that work together to form bone tissue. This is vital for the athlete whose body is in a state of constant work and recovery, allowing the body to regenerate and grow stronger. Choosing an optimal diet prior to any sporting activity can help reduce some of the acute loads associated with exercise. When the athlete eats healthily with the appropriate lifestyle, accompanied by appropriate training, his performance increases positively. Among the factors affecting the diet of the person, the physical activity status of the person is also important. The type, duration and frequency of sports also affect the diet and nutritional needs of people with active sports life. Nutritional needs are determined by the age of the athlete, his physical ability, the level of competition in the field he plays, the environment, the duration of the competition, the time between matches and many other factors (Cupisti et al., 2002; Stoll, 2018; Capling et al., 2021; Eck and Byrd-Bredbenner, 2021; Ozener et al., 2021).

2. MATERIAL AND METHOD

In the scope of this study, information on the situation of the olive in the athletes' life were given. The benefits and pharmacological effects of the olive leaves and the consumption by the athletes were explained. And also for proving the effects of the plant *Olea europaea*, the antioxidant activity assays were done by using the material which was cultivated from Ödemiş, İzmir.

2.1 Plant Material

Plant materials were collected from Dallık, Aktepe village, Beydag (Odemis, Izmir, Turkey) in June 2021. The leaves were stored in a dark and dry place until extraction The extraction method adopted was according to the procedure of Gariboldi et al. (1986) with some alterations. The leaves of the plant were ground using a blade mill (Retsch GmbH SK 1; Germany). Then, powdered plant extracts were prepared using 96% ethanol at a concentration of 5 g/100 ml. Extraction was completed after 24 hours at room temperature in a shaker incubator (Thermo Scientific Max Q 6000). The resulting extracts were filtered. Afterwards, the liquid filtrates obtained from the extract were concentrated and evaporated to dryness at 40°C under vacuum pressure with a rotary evaporator to obtain the crude extracts.

2.2 Antioxidant Activites

For determining the antioxidant capacities of the plant, DPPH and ABTS assays were done. And also total phenolic content of the plant extract was detected by using Folin-Ciocalteu method. The measurement of DPPH free radical scavenging activity was carried out according to the method of Fukumoto and Mazza (2000) with some modifications. The measurement was carried out on a 96-well microplate. Microdilution series of samples (1 mg/mL, dissolved in MeOH) were made starting with 150 mL. To each well, 50 mL of DPPH reagent (100 mM, made with HPLC grade MeOH) was added to gain 200 mL of working volume. The microplate was stored at room temperature in dark. The absorbance was measured after 30 min at 550 nm using a BMG Labtech FluoStar Optima plate reader. For the blank control, HPLC-grade MeOH was used instead of the sample. As a standard, ascorbic acid (0.01 mg/mL, in HPLC grade MeOH) was used. The evaluation of EC_{50} value was carried out with the help of Graphpad Prism 6.05 (GraphPad Software, La Jolla, CA).

For the ABTS [2,2'-azinobis (3-ethylbenzotiazolyn-6-sulfonic acid) diammonium salt] assay, an ABTS solution was prepared and diluted with ethanol until reaching 0.750 absorbance at 734 nm (Re et al.

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1999). About 0.1 ml of the extract and 10 ml of a-tocopherol were added to 1ml of the ABTS solution, and absorbance changes were observed in 734 nm in 6 minutes. For the standard solution, α-tocopherol was used. The ABTS scavenging activity was calculated using the equation:

% ABTS = [Abs_1– Abs_2]/Abs_1 x 100 (Abs_1: the absorbance value obtained from the first measurement, Abs_2: the absorbance value obtained from the second measurement).

For determining the total phenolic content (TPC), about 2.8 ml of deionized water, 2% Na_2CO_3 and 0.1 ml of the Folin–Ciocalteu reagent were added to the 100 µL test solution in accordance with the Folin–Ciocalteu method (Ragazzi and Veronese, 1973). Thereafter, an absorbance measurement was made against the blank solution at 750 nm. Calibration curves were prepared with gallic acid, and the antioxidant activity was determined based on the curve equation.

2.3 Data Analysis

All experiments were repeated 3 times. For the analysis of the data GraphPad Prism 6.05 program was used.

3. FINDINGS

Table 1. The antioxidant capacities of the plant material

	TPC (mg GAE/g)	DPPH EC_{50} (µg/mL)	ABTS (µmol/g)
Olea europaea L.	39.26 ± 1.12*	16.774 ± 0.25	73.625 ± 0.49
Gallic acid	96.45 ± 0.89	-	-
Ascorbic acid	-	2.45 ± 0.47	-
α-tocopherol	-	-	105.781 ± 1.45

TPC: Total phenolic content

** All the values were represented as mean ± SD (n=3).*

The results of the antioxidant activity assays of the plant *Olea europaea* L. was shown in Table 1. According to the results in the table, it is seen that the antioxidant capacity of the plant is quite high when compared to the standard. As a matter of fact, another data supporting this is the high amount of total phenolic content.

4. DISCUSSION

In a previous study, the use of olive leaf extract has been shown to significantly increase return to play, although it did not significantly reduce the occurrence of upper respiratory tract infections in high school athletes (Somerville et al., 2019). In another study, olive oil consumption was shown to reduce muscle damage and cardiac stress in marathon athletes (Mielgo-Ayuso et al., 2020). There are also studies showing the antioxidant activities of extracts prepared from olives collected from different regions (Kontogianni and Gerothanassis, 2012).

The qualitative and quantitative phenolic composition of olive leaves can vary depending on many factors such as the region where the plant was collected, date of harvest, drying conditions and

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extraction procedure. Therefore, it is impossible to obtain exactly the same results in studies conducted with the same olive species. Therefore, it is possible to come across many DPPH, ABTS and TPC determination results that have obtained different data using olive extract (Kiritsakis et al., 2010; Borjan et al., 2020).

It was also seen in a study that olive leaf extract was beneficial for both lipid profile and glycemic control in rats caused by diabetes (Abunab et al., 2017). With this result, it is predicted that it will be beneficial for humans as well. This situation supports that olive should be included in the healthy nutrition diet of athletes.

In studies conducted on extracts prepared from olive leaves collected in different regions, the compositions of the secondary metabolites in its content were shown and it was proven that they generally showed their effects with the phenolic compounds they contained (El and Karakaya, 2009; Abaza et al., 2015). In addition to the total phenolic content determination made in this study, it has been shown that the olive leaf extract used has a high phenolic content. This, in addition to its antioxidant activity, supports many important pharmacological activities (Boss et al., 2006; Kermanshah et al., 2020).

In addition, extracts from olive leaves have recently been marketed as a dietary product (Briante et al., 2002). These products are available in different pharmaceutical forms such as dried leaves, powder, extract or capsules.

5. CONCLUSION

Olive leaf is a product of olive tree cultivation. Large quantities of leaves are collected as crops during pruning, harvesting and processing. These products, which can be obtained frequently throughout the year, can be used as an inexpensive source of highly important phenolic compounds. The phenolic composition of olive leaves is affected by various factors demonstrated by the different methods and analytical techniques used. Each bioactive ingredient can be used in drugs, pharmaceuticals, cosmetics, to improve the shelf life of foods and develop functional foods. Therefore, the evaluation of olive leaves should be encouraged.

Literature studies have also shown that olive should be included in everyone's nutrition program, with its numerous benefits and positive effects on health. Of course, athletes should pay extra attention to their nutrition, considering that they do heavy exercises and sports activities. With this study, it has been proven that the antioxidant capacity of olive leaf extract is high and the existing literature studies are supported. It is obvious that olive, which has proven antioxidant, anticancer, hypoglycemic, hypocholesterolemic, anti-inflammatory effects, should be a must in an athlete's life. It is expected that this study will be beneficial to academic and industrial researchers interested in antioxidants, food additives, functional foods and olive leaf, together with its contribution to previous studies.

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Conflict of Interest

The author did not state any conflict of interest in the study and publication.

Ethical text

In this article, the journal writing rules, publication principles, research and publication ethics, and journal ethical rules were followed. The responsibility belongs to the author (s) for any violations that may arise regarding the article.

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