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Biologic Activities of Different Extracts of *Coronilla parviflora* Moench Flowers

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ResearchArticle

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ABSTRACT

In this study, the antioxidant activities of water and methanol extracts obtained from flowers of *Coronilla parviflora* were investigated. The antioxidant activities were determined using the DPPH and ABTS radical scavenging activity method. According to the obtained data, it was seen that the antioxidant activity value of the methanol extract had a stronger effect than the water extract. In the same time, the TPC (Total Phenolic Content) value of the methanol extract was also found to be higher than the water extract of flowers of *Coronilla parviflora*. The major component of the methanol extract was found to be" Palmitinic acid" with 20.85%, while the major component of the water extract was found to be "4H-Pyran-4-one, 2,3-dihydro-3,5-di hydroxy-6-methyl" with 23.72%.

Keywords: ABTS, antioxidant, Coronilla parviflora, DPPH, TFC, TPC

Coronilla parviflora Moench Çiçeklerinin Farklı Ekstraktlarının Biyolojik Aktiviteleri

Süreç

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ÖZ

Bu çalışmada, *Coronilla parviflora* çiçeklerinden elde edilen su ve metanol ekstraktlarının antioksidan aktiviteleri araştırılmıştır. Antioksidan aktivite değerleri DPPH ve ABTS radikal süpürücü aktivite yöntemi kullanılarak belirlenmiştir. Elde edilen verilere göre metanol ekstraktının antioksidan aktivite değerinin su ekstraktına göre daha güçlü etkiye sahip olduğu görülmüştür. Aynı zamanda metanol ekstraktının TPC (Total Fenol Miktar) değeri de *Coronilla parviflora* çiçeklerinin su ekstraktından daha yüksek bulunmuştur. Çalışma sonucunda metanol ekstraktının ana bileşeninin %20,85 ile "Palmitinik asit", su ekstraktının ana bileşeninin ise %23,72 ile "4H-Pyran-4-on, 2,3-dihidro-3,5-dihidroksi-6-metil" olduğu tespit edilmiştir.

Anahtar Kelimeler: ABTS, antioksidan, Coronilla parviflora, DPPH, TFC, TPC

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Introduction

Coronilla parviflora Moench belongs to the Fabaceae family (Lahora Cano et al., 2012). *Coronilla cretica* L. is synonym name of C. parviflora. It is popularly known as crown grass. This plant grows spontaneously in April-June in destroyed places (Karaca, 2008). *Coronilla varia* subsp. *varia* that a different species of the *Coronilla* genus, is dried and consumed by brewing. The tea of it obtained has a soothing effect (Batı Erdem, 2018). *Coronilla varia* is traditionally used as a diuretic as well as for prostate diseases. While the dried bark has an emetic effect, it is said to be good when crushed and applied to the joints. However, the whole plant has toxicological effects as well as pharmacological effects (Anonym, 2022; Al-Snafi, 2016; Moerman, 1998). The seeds of *Coronilla varia* contain coumarins and cardiotonic glycosides, as well as a toxic component such as the neurotoxin β-nitropropionic acid (Opletal et al., 1998; Komissarenko, 1969; Kovalev and Komissarenko, 1983; Harmatha et al., 1992; Campbell, 2006). In addition, flavonoids are also found in the leaves of Coronilla (Noori, 2012).

The level of development of countries is effective on the rate of use of medicinal and aromatic plants in treatment, the rate of treatment with herbal products is 80% in developing countries, while this value is 95% in some countries of regions such as the Middle East, Asia, Africa (Titz, 2004). Today, the return to nature and nature is increasing rapidly in cases where synthetic drugs sometimes cause allergies or bacteria have gained resistance to antibiotic-style drugs because of continuous use. According to the WHO (World Health Organization), 25% of prescription drugs are medicinal and aromatic plant-based and when the FAO (Food and Agriculture Organization) data are examined, 30% of the drugs sold worldwide consist of compounds derived from medicinal plant (Acıbuca and Bostan Budak, 2018; FAO, 2005).

Medicinal plants today are used in many fields such as cosmetic, food, paint, textile, medicine, agriculture. In recent years, medicinal and aromatic plants have become the focus of attention due to the secondary metabolites they contain. Because of these properties, these plants are used in the fields of therapy and phytotherapy (Sezik et al., 1992; Yeşilada et al., 1993; Sökmen et al., 1999). Some herbal components have effects on preventing cancer and anti- aging (Do et al., 2004; Albayrak et al., 2010).

In this study, the antioxidant activity of the water and methanol extracts of the *Coronilla parviflora*, about which there is no study, was evaluated by the DPPH and ABTS radical scavenging activity methods. At the same time, the total phenol and flavonoid content of the extract were determined spectrophotometrically, and the phytochemical composition of the extract were also analyzed by GC-MS.

Material and Methods

Preparation of Extracts

The plant materials of *Coronilla parviflora* were collected from the flora of Sivas Cumhuriyet University Campus in the province of Sivas. The antioxidant activity tests were conducted in the Advanced Technology Research and Application Center (CÜTAM), Cumhuriyet University, Sivas, in 2019. All the experiments were carried out in three replications and randomized design were used as a trial design.

The Chemical Composition

10 g of dried plant samples were grounded and soaked in 50 mL of water and methanol separately for 24 h with intermittent shaking. Then, the extract was filtered and dried in controlled condition. The dried extracts were kept in refrigerator until use for biological activity study and analyzed using GC–MS (Gas chromatography-mass spectrometry).

In vitro Antioxidant Activity

The DPPH radical scavenging activity of the extracts was evaluated according to the Blois method (1958) with slight modification. ABTS radical scavenging activity was evaluated by the method of Re et al. (1999) with minor modifications. Total phenolic content was determined with spectrophotometric method (Clarke et al. 2013) and expressed as gallic acid equivalents (mg GAE/g dw) and the total flavonoid content was determined with the aluminum chloride colorimetric method of Molan and Mahdy (2014), was expressed as milligrams of catechin equivalent per gram of the dry weight of the extract (mg CE/g dw).

Results and Discussion

The Chemical Composition of The Water and Methanol Extracts of Coronilla parviflora

The chemical composition of the water and methanol extracts of flowers of *Coronilla parviflora* analyzed by GC-MS. The major component of the methanol extract was found to be" Palmitinic acid" with 20.85%, while the major component of the water extract was found to be "4H-Pyran-4-one, 2,3-dihydro-3,5-di hydroxy-6-methyl" with 23.72%. It was observed that the chemical composition value of the methanol extract was higher than that of the water extract (Table 1).

Table 1. The chemical composition of the water and methanol extracts of flowers of Coronilla parviflora analyzed by GC-MS

No	RT		Relative percentage (%)	
0		**Components**		
			Water	**Methanol**
	6.909	2-Furanmethanol		3.66
	8.717	2(5H)-Furanone		1.23
	11.138	2,3-Dihydro-3,5-dihydroxy-6-methyl -4H-pyran-4-one		2.54
	11.258	Phenol		3.15
1	14.199	2,5-Dimethyl-4-hydroxy-3(2H)-furanone	1.18	
	16.259	2-Propyltetrahydropyran		1.90
2	16.522	Ethanamine, N-ethyl-N-nitroso	4.90	
3	16.785	4H-Pyran-4-one, 2,3-dihydro-3,5-di hydroxy-6-methyl	23.72	5.36
4	18.834	1,2,4-Triazolo(4,3-a) pyrimidine	3.36	
	18.891	4-vinylphenol		3.26
5	20.928	Hydroquinone	1.07	
6	22.484	2-Methoxy-4-vinylphenol	1.27	3.69
7	26.953	Methyl 3-hydroxybenzoate		1.17
8	28.246	1-Dodecanol		3.13
9	29.328	Phenol, 2,4-bis(1,1-dimethylethyl)		2.37
10	30.701	Dodecanoic acid		1.66
11	34.912	Tetradecanoic acid		3.25
12	35.141	(-)-Loliolide		1.59
13	37.710	Methyl palmitate		1.73
14	38.511	Palmitinic acid		20.85
15	41.195	Linolenic a cid, methyl ester		2.05
16	41.470	Octadecanoic acid		1.34
Total			**35.5**	**63.93**

Antioxidant Activity

DPPH and ABTS Radical Scavenging Activity

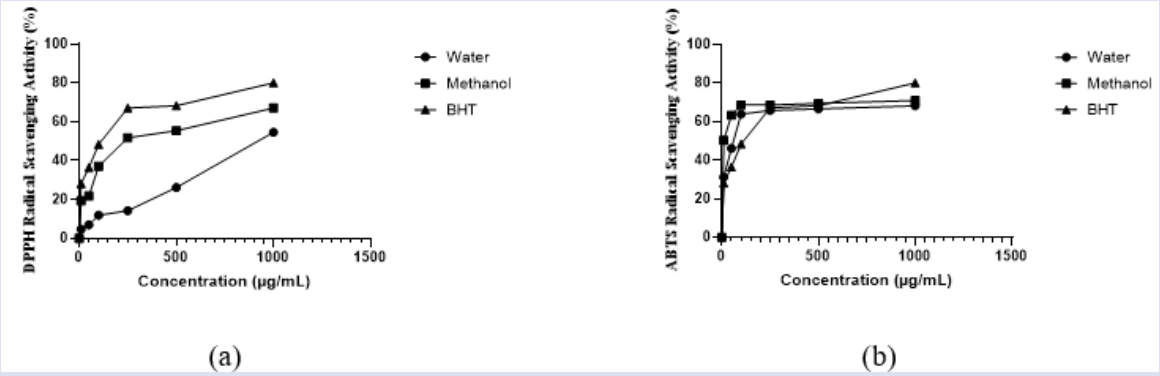

Figure 1. The In vitro antioxidant activities ((a) DPPH and (b) ABTS) of the water and methanol extracts of Coronilla parviflora flowers

The in-vitro antioxidant activities, DPPH and ABTS radical scavenging activities of flowers of *Coronilla parviflora* in both water and methanol extracts, were compared with the standard antioxidant compound BHT. According to the obtained data with DPPH radical scavenging activities methods, the antioxidant activity of the methanol extract was found to be better than the water extract (Figure 1(a)). According to the ABTS radical scavenging activities method in Figure 1(b), the antioxidant activity values of water and methanol extracts were found to be close to each other. Ferrante et al. (2020) investigated the antioxidant activity of *Coronilla minima*, which is another species belonging to the *Coronilla* genus. Although the total flavonoid and phenol content of the water extract of *Coronilla minima* was richer than the hydroalcoholic extract, the antioxidant content of the hydroalcoholic extract of *Coronilla minima* was found stronger than the other.

Total Phenolic Content (TPC) and Total Flavonoid Content (TFC)

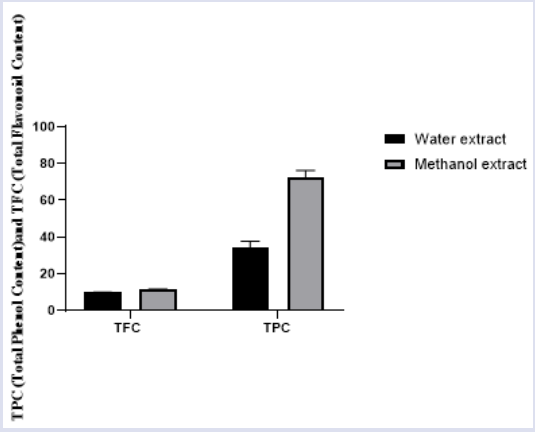

Figure 2. Total Phenolic Content (TPC) and Total Flavonoid Content (TFC) of the water and methanol extracts of Coronilla parviflora flowers

As shown in Figure 2, the TPC values have been detected high amount than the TFC values for both water and methanol extracts of flowers of Coronilla parviflora. On the other hand, when the TPC value of methanol and water extracts were compared, it had been seen that the methanol extract had a higher value (76.61± 3.64 mg GAE/g) than the water extract (34.17 ± 3.66 mg GAE/g). The TFC was found as 11.39 ± 0.37 mg CE/g higher in methanol extract and 9.85 ± 0.07 mg CE/g in water extract.

Conclusions

In this study, the antioxidant activities and chemical composition values of water and methanol extracts obtained from Coronilla parviflora flowers were investigated. With the obtained data, it has been tried to establish the basis for future researches with this plant species, which has not been studied much. In the light of the results obtained, it was determined that the antioxidant activity and TPC values of the methanol extract were higher than the water extract of flowers of Coronilla parviflora. The antioxidant and antimicrobial activities of plants are due to the phenol and flavonoid compounds found in plant metabolites. The major component of the methanol extract was found to be" Palmitinic acid" with 20.85%, while the major component of the water extract was found to be "4H-Pyran-4-one, 2,3-dihydro-3,5-di hydroxy-6-methyl" with 23.72%.

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