



A study of ocimum basilicum bioactivity: a Review

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Abstract

One of the most significant crops is basil "Ocimum basilicum" , which also contains flavonoids, phenolic acids, polyphenols, and phenolics . Basil has been demonstrated to be effective against viral, fungal, bacterial, and other illnesses. Basil Seed Gum is another name for basil seed mucilage. Mucilage from basil seeds is employed as a texurizer, stabilizer, thickening agent, hydrocolloid that is surface-active, and emulsifier. Traditional Uyghur medicine uses Ocimum basilicum L. (OBL) as a herb to treat and prevent cardiovascular disease. In addition, inevitably express in the antihypertensive and antithrombotic effect, that found in earlier research, which showed a function for prostaglandins.

دراسة النشاط الحيوي لنبات الريحان (Ocimum basilicum): مراجعة

وزارة التربية والتعليم - المديرية العامة للتربية في محافظة النجف

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المخلص

يعتبر نبات الريحان (Ocimum basilicum) من أهم المحاصيل، ويحتوي أيضاً على الفلافونويدات والأحماض الفينولية والبوليفينولات والفينولات. وقد ثبت أن الريحان فعال ضد الأمراض الفيروسية والفطرية والبكتيرية وغيرها. صمغ بذور الريحان هو اسم آخر لمخاط بذور الريحان. يتم استخدام مخاط بذور الريحان كملين ومثبت ومكثف وهيدروكولويد نشط على السطح ومستحلب. يستخدم الطب الأويغوري التقليدي نبات الريحان (Ocimum basilicum L. (OBL) كعشب لعلاج والوقاية من أمراض القلب والأوعية الدموية. علاوة على ذلك، يعبر هذا حتماً عن التأثير الخافض لضغط الدم ومضاد التخثر، الذي وجدته الأبحاث السابقة، والتي أظهرت وظيفة البروستاجلاندين.

1. Introduction

The Lamiacea family plant Ocimum basilicum L. (OBL) is used in conventional Uyghur medical school for the treatment of or avoidance of heart disease. Previous research has shown that OBL can block block ADP and thrombin-induced aggregation of platelets in experimental thrombosis models, as well as treat or prevent cardiovascular disease in hypertensive rats (Umar et al., 2010). shown that OBL extracts had renal-related antihypertensive effects. Over thirty plant and shrub species are found in Ocimum. Its shape, color of bloom, growth pattern, chemical composition, leaves, and stems varied greatly. Africa, Asia, and Central and South America are the native habitats of the species. It was dubbed the herb of kings by the ancient Greeks. Other names for Ocimum basilicum L. include Albahaca in Spanish, Basilic in French, Basilikum in German, and Basil in English. In Persian and Arabic, it is also



called reihan and rehan, respectively. Similar to OBL, ocimum sanctum contains COX-inhibitory and anti-inflammatory properties (Kelm et al., 2000).

O.basilicum's secondary metabolite composition, which includes polyphenols, flavonoids, essential oil, and terpenic (mono- and sesquiterpenes), has been associated to health benefits, antioxidant and antibacterial activities.

(Al-Abbasy et al., 2015; Kisa et al.,2021; Romano et al.,2022; Kacaniova et al.,2022).

2. Review

2.1.Taxonomy and origin

The Lamiaceae family, which has 200 genera and 3,200 species, contains the genus Ocimum. Among the Lamiaceae family's most significant genera is Ocimum. There are about 150 species in Ocimum (Nassar et al., 2013). Often referred to as basil sweet leaves or basil. (Bravo and others, 2021). It was categorized as:

Kingdom Plantae

Phylum Magnoliophyta

Class Magnoliopsida

Order Lamiales

Family Lamiaceae

Genus *Ocimum*

Species *basilicum* (Purushothaman et al.,2018)

Originating in warm, tropical regions including Southern Asia, Africa, India, Central America, and South America

(Putievsky and Galambosi ,2005; Beatovic et al.,2015), It is mostly found in Pakistan and India, where it has been farmed for around 5000 years.

It can be found anywhere in the world these days (Nadeem et al., 2020). Many warm, temperate nations, such as France, Hungary, Greece, and other southern European countries, as well as North America, cultivate it for commercial purposes (Pushpangadan and George, 2012).

2.2. Botanical description

Basil plant is an annual herbaceous plant (Lim and Eom, 2013), it may be either green or purple (Pirmoradi et al., 2013) ,The leaves are green and scarlet in hue, with an oval, simple, entire, opposite, and softly undulated edge. They have a 3-5 cm long slender petiole with many teeth.

It has blooms that are 8–12 mm long and grouped in rings with six–ten blossoms each. The petals could have a pink, purple, or white hue. As seen in Figure 1, glandular and non-glandular hair can be found on both sides of the herb's leaves (Khair-ul-Bariya et al., 2012).



Figure (1): Different *O.basilicum* plant part a-leaf green cultivar b-leaf red cultivar c-seeds e-white flowers f-red flower g-stem and roots (<https://plantvillage.psu.edu/topics/basil/infos>)

2.3. Nutrient



Protein, carbs, lipids, oils, minerals, vitamins, and water make up the Ocimum, which is necessary for the growth and development of both humans and animals. Plants are frequently thought of as having the most basic nutritional value.(Shuaib and others, 2015).

In human nutrition, especially micronutrients (Leal et al., 2008), which are crucial for the production of various proteins and an important system of enzymes that help humans become more resistant to sickness (Fraga ,2005).

2.4. Phytochemicals and Medicinal important

The secondary metabolites of *O. basilicum* include flavonoids, flavones, and polyphenols. Additionally, it contains terpenic chemicals found in essential oils, such as alpha-cadinol, geraniol, linalool, limonene, and caryophyllene (Kisa et al., 2021).

The abundance of phenolic and flavonoid molecules, or secondary metabolites, in *O. basilicum*'s leaves is what gives rise to its purported health advantages. The scientific literature and conventional medicine have provided the most comprehensive descriptions of these drugs' bioactivities (Bilal et al.,2012; Al Abbasy et al.,2015).

The bioactivities of plant extraction are known to be impacted by the kind of accession, conditions of growth, and season of harvest (Da Costa *et al.*,2015; Soro *et al.*,2016) .

Differential bioactivity can be found in all sections of a vegetable, allowing certain medicinal aims to be met while also monetizing plant subparts that would otherwise be considered low-value co-products. Basil species are largely studied for their leaves and vital oils (Kelm *et al.*, 2000; Genfi *et al.*,2020).

2.5. Antimicrobial activity

The Moghaddam group (2011) Traditional gram-negative bacteria like *E. coli* and *P. aeruginosa* as well as gram-positive bacteria like *B. cereus* and *S. aureus* were used to assess the antibacterial qualities of basil essential oil. Plant phytochemicals offer numerous health advantages and are powerful antioxidants against reactive oxygen species. According to Narzary et al. (2016), antioxidants have the potential to protect chronic diseases like diabetes, cardiovascular disease, and cancer by counteracting free radicals in the body.

According to Ahmed et al. (2019), phytochemicals from plants have a number of health advantages and are powerful antioxidants that defense reactive oxygen species. In addition to potentially assisting in the prevention of chronic illnesses including diabetes, cancer, and cardiovascular disease, these



antioxidants can aid the body combat free radicals. Nguyen and associates, (2021) Numerous pharmacologically active compounds, such as alkaloids, coumarins, tannins, flavonoids, sugars, phenols, terpenoids, and saponins, have been identified in sweet basil leaves. Additionally, the ethanolic extract of the leaves exhibited potent antioxidant properties. These findings suggest that natural antioxidants may be present in this plant.

2.6. Antioxidant activity

By behaving as "free radical scavengers," antioxidants prevent or mitigate the negative effects that free radicals may be causing. Antioxidants are a class of compounds that have the ability to delay or prevent the oxidation of lipids and other biomolecules, and thus prevent or repair the damage caused by oxygen to body cells (Msaada et al., 2017). Antioxidants also function as reducing agents, eventually eliminating free radical intermediates and inhibiting further oxidation (Adusei et al., 2019).

Antioxidant capacity assays are classified into three types: spectrometry, electrochemical methods, and chromatography. Their principles and end products differ (Moharram and Youssef, 2014).

Antioxidants are classified according to a variety of properties. The first property is function-based (antioxidants (primary and secondary). According to Carocho and Ferreira (2013), the second aspect is predicated on both enzymatic and non-enzymatic antioxidants.

DPPH (The 2,2-Diphenyl-1-picrylhydrazyl) is a persistent radical in solution that absorbs light at 515 nm in methanol and has a purple color. The theory behind this assay is that DPPH is reduced to DPPH₂ and turns yellow when it takes up a hydrogen (H) atom from an antioxidant, or scavenger molecule. This results in a drop in absorbance at 515 nm.

Using spectrophotometry, the color shift is detected and parameters for antioxidant properties have been determined. (Mishra *et al.*, 2012).

Plant phytochemicals have many health advantages and are effective antioxidants that combat reactive oxygen species. According to Narzary et al. (2016), these antioxidants can help the body combat free radicals and may prevent chronic illnesses like diabetes, cancer, and cardiovascular disease.

Nadeem et al., (2022) have found of the best antioxidant activity and potentially beneficial therapeutic potential were obtained from ethanol extracts with with a significant concentration of secondary metabolites found in plants, including tannin content, flavonoids, and total phenolic acid.

Basil plants are known to contain high concentrations of various plant secondary metabolites, including total phenolic acids, flavonoids, and tannins (Srivastava et al., 2016). These bioactive compounds contribute significantly to



the antioxidant capacity and potential medicinal applications of the basil species (Hussain et al., 2008). The accumulation of these secondary metabolites can be influenced by environmental factors, such as light and temperature conditions, which have been shown to impact the overall phytochemical profile of the plant (Morales-Soto et al., 2021). The rich diversity of these beneficial plant compounds highlights the value of basil as a source of natural antioxidants and bioactive substances for both culinary and pharmaceutical use.

Ahmed *et al.*, (2019) Both the overall phenolic content of basil extracts and the broad spectrum of free radical scavenging activity in essential oils were significantly correlated with antioxidant activity.

The biological activity profile of plant extracts from leaves and stems varied at the antioxidant level, suggesting that extracts from co-product stems, in addition to leaves, had unique therapeutic potential (Bensaid et al., 2022).

Several pharmacologically active substances, such as alkaloids, coumarins, tannins, flavonoids, sugars, phenols, terpenoids, and saponins, were found in the leaves of sweet basil, according to research done by Nguyen et al. in 2021. An ethanolic extract of the leaves also showed strong antioxidant activity. These results suggest that this plant may be a good source of free radicals.

3. Conclusion

In conclusion, basil is a diverse plant species containing a range of valuable fatty acids, including stearic, oleic, palmitic, linoleic, myristic, α -linolenic, capric, lauric, and arachidonic acids (Cheng et al., 2022). Furthermore, environmental factors such as increased light exposure and temperature have been observed to influence the antioxidant capacity of the plant (Morales-Soto et al., 2021). Basil's ease of extraction and distinctive functional properties have led to its classification as a commercial hydrocolloid within the food industry (Huang et al., 2019). Based on the gathered evidence, basil demonstrates significant potential for applications in both culinary and medicinal domains, warranting further exploration and utilization (Vieira & Simon, 2006).

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