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Chemical Constitutes and Health Importance of Sweet Basil (*Ocimum basilicum* L.): A Review

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ABSTRACT

There is an increasing demand for natural compounds as a substitute for traditional medications, particularly with global health concerns such as drug resistance and the adverse effects of synthetic drugs. Plant extracts are being explored as an alternative because they are considered safer and have the potential to reduce side effects. This review is intended to cover the chemical constituents and health importance of this important medicinal herb. Sweet basil (*Ocimum basilicum*) is a significant crop that contains essential oils, polyphenols, phenolics, flavonoids and phenolic acids. This annual plant belongs to the mint family and is indigenous to tropical regions. Traditionally, it has been used in kidney problems, as a hemostyptic in childbirth, earache, menstrual irregularities, arthritis, anorexia, treatment of colds and malaria. Sweet basil has been shown positive effects against viral, fungal, bacterial and some infections. Its leaves have been used in the treatment of fevers, coughs, flu, asthma, bronchitis, influenza and diarrhea. The most important pharmacological uses of sweet basil are anti-cancer activity, radioprotective activity, anti-microbial activity, anti-inflammatory effects, immunomodulatory activity, anti-stress activity, anti-diabetic activity, antipyretic activity, anti-arthritic activity, anti-oxidant activity, as a prophylactic agent and in cardiovascular disease.

KEYWORDS

Ocimum basilicum, aromatherapy, coughs, haemo styptic, pharmacological, Sweet basil

INTRODUCTION

Sweet basil (*Ocimum basilicum*) is a crucial crop known for its essential oils, polyphenols, phenolics, flavonoids and phenolic acids. This annual plant is a member of the mint family and is native to tropical regions[1]. The sweet basil essential oil has many biological activities. It has anti-inflammatory and antioxidant properties[2], as well as antimicrobial[3], antiviral[4] and anticancer[5] properties. In traditional medicine, it is used to treat malaria, colic vomiting, the common cold, cough, headaches, diarrhea, inflammation, pain and skin diseases. Externally, it has been applied to treat acne, loss of smell, insect stings and skin issues. Because of its aroma, basil is widely used for flavor and fragrance in the food, pharmaceutical, cosmetic and aromatherapy industries[6-10]. The most important pharmacological uses of basil are anti-cancer activity, radioprotective activity, anti-microbial activity, anti-inflammatory effects, immunomodulatory activity, anti-stress activity, anti-diabetic activity, anti-pyretic activity, anti-arthritic activity, anti-oxidant activity, as a prophylactic agent and in cardiovascular disease. Some of the stated

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uses are associated with the main constituents found in the *O. basilicum* L. plant parts. These constituents include linalool, eugenol, estragole, geranial, methyl eugenol, 1,8-cineole and other compounds[11]. These compounds have been found to play important roles as antimicrobials, antioxidants, anticancer agents and antidiabetics[12]. Certain chemical compounds, specifically linalool and eugenol, are currently in high demand due to their different disease resistance for medical use[13]. This review paper aims to provide information on the chemical composition and pharmacological action of *O. basilicum* L. in different parts of the world.

Chemical composition and importance of basil

Major chemical compound: The chemical composition of basil essential oil has been investigated since the 1930s and by now more than 200 chemical components have been identified which revealed a huge diversity in the constituents of its oil from many regions of the world[14]. The chemical constituents showed the presence of monoterpene hydrocarbons, oxygenated monoterpene, sesquiterpene hydrocarbons, oxygenated sesquiterpene, triterpene, flavonoids, aromatic compounds, terpenoids, alkaloids, tannins, saponin glycosides and ascorbic acid[14,15]. The main volatile chemical constituents of basil are linalool, linalyl acetate, geraniol, citral, camphor, eugenol, methyl eugenol, methyl chavicol, methyl cinnamate, thymol, safrol, etc. These constituents vary from species to species[16]. Several essential oils and aroma compounds found in different basil lines, methyl chavicol, methyl cinnamate, citral, eugenol, linalool and camphor are traded in the international essential oil markets.

The type of chemotype can affect the main chemical constituent of *O. basilicum* L.[17,18] discovered five chemotypes, among which (A) linalool; (B) linalool/trans-α-bergamotene; (C) linalool /methyl chavicol; (D) linalool/trans-methyl cinnamate; and (E) methyl chavicol. Based on the distribution in the regions, chemotypes A and C are European chemotypes; D is a tropical chemotype; and E is a reunion chemotype. Likewise, Bernhardt e*t al*.[19] alsoreported seven chemotypes; (1) linalool, (2) methyl cinnamate, (3) methyl cinnamate/linalool, (4) methyl eugenol, (5) citral, (6) methyl chavicol (estragole) and (7) methyl chavicol/citral. Likewise, Sharopov *et al*.[20] found two chemotypes in *O. basilicum*; (I) Linalool rich and (II) Linalool/methyl chavicol chemotype. In addition, Gossa *et al*.[21] characterized *O. basilicum* into six chemotypes; linalool (I), eugenol (II), estragole (III), methyl eugenol (IV), 1,8-cineole (V) and geraniol (VI). Similarly, Iijima *et al*.[22] characterized *Ocimum basilicum* into four chemotypes; (A) eugenol/estragole/eucalyptol/b-Bisabolene, (B) eucalyptol/estragole, (C) linalool/geraniol and (D) methyl cinnamate/linalool. This result is also based on the distribution in the regions, chemotypes B and D are European chemotypes and a tropical chemotype, respectively.

The extract and essential oil of *O. basilicum* L. contain various classes of chemical compounds that are primarily synthesized through one of three biosynthetic pathways. Monoterpenes such as 1,8-cineole, linalool and linalool acetate are produced through the non-mevalonate biosynthetic pathway. Sesquiterpene trans-α-bergamotene is derived from the mevalonate biosynthetic pathway, while phenylpropane derivatives like methyl chavicol, eugenol and trans-methyl cinnamate are synthesized via the phenylpropene biosynthetic pathway[22].

Importance of basil: The sweet basil plant, also known as *Ocimum basilicum*, is widely used in the pharmaceutical, cosmetics, aromatherapy and food industries[23]. It is used medicinally to treat conditions such as malaria, colic vomiting, the common cold, cough, headaches, diarrhea, inflammation, pain, skin diseases and others[7]. Marwat *et al*.[14] reported that pharmacological activities of sweet basil have been studied in different parts of the world.

The plant *O. basilicum* (sweet basil) has been reported to have a wide range of medicinal properties. It has been found to exhibit antibacterial, antifungal, antiproliferative/anticancer, anti-dyspepsia, antigiardial, anti-inflammatory, antioxidant, antiulcer, antiviral, insecticidal and wound-healing activities. Additionally, it has shown cardiac stimulant effects, effects on the central nervous system, hypoglycemic

and hypolipidemic effects and inhibitory effects on platelet aggregation. Various parts of the plant have been used in traditional medicine. The leaves and flowering parts are traditionally used to treat various conditions such as fever, poor digestion, nausea, abdominal cramps, gastroenteritis, migraine, insomnia, depression, gonorrhea, dysentery and chronic diarrhea exhaustion. Externally, they have been used to treat acne, loss of smell, insect stings, snake bites and skin infections.

Otti *et al*.[24] have discussed the biological activity of basil plants and their abilities to prevent microbes, fungi and insects. Basil plants are economically important due to the wide variety of essential oil compounds that can be derived from them. Basil leaves have been a popular spice for centuries and today, basil essential oils are used in hygiene and cleaning products, perfumes, cosmetics, as well as local anesthetics and antiseptics. Most commercially available basil cultivars belong to the common basil (*Ocimum basilicum* L.). Due to the continuous demand for new flavors, many *Ocimum basilicum* cultivars have been bred during the herb's long history of cultivation[25].

CONCLUSION

Sweet basil is a plant species that is widely distributed throughout several regions of the world. There has been a significant evolution in our understanding and application of this plant in healthcare over time. The plant is considered a highly valuable source due to its distinctive chemical composition, which provides a diverse array of antimicrobial and other medicinal attributes, including anticancer, antioxidant, antidiabetic and neuroprotective functions. This plant has the potential to change how drugs are produced, either by isolating pure phytochemical compounds or by combining several compounds.

SIGNIFICANCE STATEMENT

Nowadays there are so many drugs resistant to syntactic medicine for different diseases. So, the focus must be given to natural products that are found in different aromatic and medicinal crops. Among highly important medicinal aromatic crops sweet basil (*Ocimum basilicum*) is important for different kinds of disease. This review paper showed the major chemicals and their health benefits. Future studies on sweet basil should be underlined for control of various diseases.

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