

Functional Properties of Basil, A Natural Medicine †

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Abstract: Basil (*Ocimum basilicum* L.) is one of the most important member of *Ocimum* genus. The dominant volatile components of basil are eugenol, methyl chavicol, linalool, methyl cinnamate and bergamotene. It is an important part cuisines in countries like Iran, China and India. The main phenolic components of basil are phenolic acids and flavonol-glycosides. The information provided is obtained from review articles, randomized control experiments, and analytical observations and studies which were gathered from different literature sources such as Scopus, Google Scholar, Science Direct and Pubmed. The keywords used were basil, basil seed mucilage, traditional Asian medicine, traditional Iranian medicine, linalool, eugenol, and traditional Chinese medicine. The main fatty acids compositions of basil species are oleic acid, stearic acid, linoleic acid, palmitic acid, α -linolenic acid, myristic acid, lauric acid, carpic acid and arachidonic acid. The most notable antioxidant components of basil are vanillic, caeffic, quercetin, rosmarinic acids, apigenin, rutin, chlorogenic, and *p*-hydroxybenzoic. Essential oils of basil are methyl chavicol, 1,8 cineole, α -Pinene, β -Pinene, ocimene, linalool, geraneol, borneol, B-caryophyllone, eugenol, and n-cinnamate. Basil has tremendous pharmacological benefits such as anti-microbial activity, anti-cancer activity, radioprotective activity, immunomodulatory effects, anti-inflammatory effects, anti-diabetic activity, anti-stress activity, anti-arthritic effect, anti-pyretic activity and it has been used as a prophylactic agent and in cardiovascular disease. The use of basil in both pharmaceutical and food industries is highly suggested.

Keywords: basil; basil seed mucilage; traditional Asian medicine; traditional Iranian medicine; linalool; eugenol; anti-cancer activity

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1. Introduction

Traditional Chinese medicine (TCM) has been used for centuries in different parts of the world [1–5], and it plays a key role in China [6–15]. In majority of Asian countries, particularly in China, traditional Chinese medicine and western medicinal knowledge have been practised side by side of each others [16–21]. With an understanding of TCM comes a wonderful and unique knowledge of Chinese fruits and herb, as both traditional health-promoting and typical ethnic foods [21–34].

Basil (*Ocimum basilicum* L.) is an important medicinal plant and oil crop. It belongs to genus of *Ocimum*, family of Lamiaceae, order of Lamiales, class of Magnoliopsida, phylum of Magnoliopsida, and kingdom of plantae. The chemical components and essential oil levels change between different cultivar and species, and different growing conditions. Its most important essential oil components are phenylpropanoids, terpenes, aldehydes, and alcohols. The aim of this review is to survey on wonderful health benefits of basil and its most important derivatives.

2. Basil (*Ocimum basilicum* L.)

Basil is an important medicinal plant, belongs to the *Lamiaceae* family, essential oil crop and culinary herb, which grows in tropical and subtropical regions [35–38]. The anatomy of a basil plant consists of main stem, node, internode, dominant growing top, future stem growth and leaves, and all parts can be used for fry flower, leaves, essential oil, and as ornamental plants [39,40]. The most important characteristics of basil are: it is an annual aromatic herb; its leaves are oval, sharp and reciprocal, its maximum height may reach to 60 cm, and it germinates 14-21 days after plantation; its flowers are aromatic, small with the color of red, white and violet; it has black and tiny seeds; its growing period is between 170 and 180 days, and it can be harvested two to three times during the growing season [41–44]. Both quality and productivity of essential oils of basil plants also vary on the basis of field conditions [45–48]. Phenolic acids and flavonol-glycosides are the major phenolic ingredients in basil [49,50]. The main fatty acid composition of basil species are oleic acid, stearic acid, linoleic acid, palmitic acid, capric acid, myristic acid, arachidonic acid and lauric acid [51], and the most notable antioxidant ingredients of basil are vanillic, caffeic, quercetin, rosmarinic acids, apigenin, rutin, and chlorogenic [52]. Essential oils of basil are methyl chavicol, α -pinene, β -pinene, linalool, 1,8 cineole, borneol, ocimene, geraneol, n-cinnamate, B-caryophyllone and eugenol [53]. Eugenol and chavicol and terpenoids are the main essential oil of basil [54–56]. The nutrient content of common basil are crude ash, dry matter, ether extract, crude protein, NFI (sugars readily hydrolyzed), crude fiber, Ca, Mg, Na, K, Cu, Fe, Zn, and Mn [57]. In food industry, it is widely used as flavoring agent, dental and oral products in fragrances [58], and in traditional medicine, its seeds use in Asian beverages and dessert as a source of dietary fiber [59]. It is also used in treatment of headache, cough, diarrhea, worms, and skin infections [60]. Basil polysaccharides have been used for cancer therapy in TCM [61,62]. Basil has been used in treatment of diseases such as pyrexia, anxiousness, arthropod stings, infections, coughs, stomach aches, constipation and headaches [63–65]. As it has high anti-diabetic and anti-spasmodic properties, it can also use to decrease and control the blood glucose [66,67]. The most notable medicinal activity of eugenol is nematocidal and anti-bacterial effects against food-borne pathogenic bacteria [68,69]. The component of essential oil in basil leaves are tannins, saponins, alkaloids, and flavonoids [70,71]. Basil seeds have antipyretic, diuretic, stomachic and antispasmodic properties [72]. Basil polysaccharides has anti-oxidant, anti-tumor, anti-bacterial, and anti-aging activities as well as useful in immunity enhancement impact, and appropriate in treatment of diabetes mellitus [73–75].

3. Conclusions

Basil (*Ocimum basilicum*) is one of the most notable crops with high essential oils as well as phenolics, polyphenols, phenolic acids, and flavonoids. Basil is an annual plant belongs to mint family, and indigenous to tropical regions. In traditional medicinal science, it has been used as a haemostyptic in childbirth, kidney problems, arthritis, earache, anorexia, menstrual irregularities, treatment of malaria and colds. It has also shown positive impacts against fungal, viral, bacterial and some infections. The leaves of basil have been utilized in treatment of coughs, fevers, asthma, flu, influenza, bronchitis, and diarrhea. Basil seed gum which is also known as basil seed mucilage can be considered as stabilizing, thickening, texturizer, fat substitute, surface-active and emulsifying hydrocolloid. It has many pharmacological benefits, but the most notable of its benefits are radioprotective activity, anti-cancer activity, anti-inflammatory effects, anti-microbial activity, anti-stress activity, immunomodulatory activity, anti-pyretic effects, anti-diabetic activity, antioxidant activity, anti-arthritis activity, as a prophylactic agent and in cardiovascular disease.

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