

Cuminum cyminum – A Popular Spice: An Updated Review

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ABSTRACT

Spices are bio-nutrient supplements that enhance the taste, flavor and aroma of food and also treat several diseases. Cumin (*Cuminum cyminum*) is one such most popular spice that is used as a culinary spice for their special aromatic effect. Cumin is a traditional and much used spice from Middle Ages because it was an icon of love and fidelity. Cumin is available in different appearances such as anise, fennel and black cumin and the difference between them is their characteristics. The proximate analysis of the cumin seeds reveals that they contain fixed oil, volatile oils, acids, essential oils, protein and other elements. In cumin, contains an important component such as pinene, cymene, terpinene, cuminaldehyde, oleoresin, thymol and others that have shown their uses according to the disease. Cumin has proved several benefits with the help of availability of nutrients. It is an important element of iron for energy, immunity systems, lactation and skin diseases. Cumin also shown various pharmacological effects but has some side effects. So, volatile plants generally come out as a complex mixture of less molecular weight lipophilic compounds that derived from different biosynthetic pathways and also contribute to a variety of physiological functions.

Key words: Spice, Cumin, Cuminaldehyde, Cymene, Thymol.

INTRODUCTION

Spices are an important bionutrients for both food ingredients and nutritional supplements. From ancient times, spices have been used as food additives to enhance the taste and be flavor of food. Apart from these uses, spices also have numerous medicinal properties and used to treat several disorders that form an important part of the Ayurvedic Pharmacopoeia (Indian System of Medicine). Spices have increasingly larger role to play in Indian recipes as the bactericidal, bacteriostatic, fungistatic, antifertility, antihelminthic and other medicinal properties and also believed to aid digestion. In the traditional Indian system of medicine, more than a few spices and herbs have hold and possess several medicinal properties such as anti-thrombotic, anti-atherosclerotic, hypolipidemic, anti-inflammatory, anti-aggregatory, eicosanoid inhibitor.¹

Cumin is popular as culinary spice and used in folklore therapy because the presence of aromatic substances in the herb. Cumin comes under the category of traditional spice from middle ages. It was too much popular, because of its peppery flavor. During the middle ages in Europe, cumin became as an icon of love and fidelity and also some people wants to carry cumin in their pockets to give in wedding ceremonies. Cumin is a small hairy, brownish in color, boat shaped seed plant that have a spicy sweet aroma property and powerful slightly bitter and pungent flavor.²

The scientific name of *Cuminum cyminum* L. (cumin) referred to as *Cuminum odorum* Salisb, *Cuminia cyminum* J.F. Gmel, *Cuminum hispanicum* Bunge, *Ligusticum cuminum* (L.) Crantz and belonging to the Apiaceae family.³ The Apiaceae family is a collection of typically

aromatic plants having hollow stems and the well-known members of this family are anise, asafoetida, caraway, carrot, celery, coriander, cumin, dill, fennel, parsley, parsnip, and sea holly.

In traditional medicines, cumin was a major component of curry and chili powder that was used to flavor a variety of commercial food products. Cumin has also been crushed and mixed with foods such as fish and meat, and the seeds sprinkled on bread and cakes. The oil, derived by steam distillation, is used to flavor alcoholic beverages, desserts, and condiments. It is also used as a fragrant component of creams, lotions, and perfumes. Cumin has been used as anti-inflammatory, diuretic, carminative, and antispasmodic, treatment of toothaches and epilepsy and also as an aid for treating dyspepsia, jaundice, diarrhea, flatulence, and indigestion. Cumin powder has been used as a poultice and suppository and has been smoked in a pipe and taken orally. The cumin plant and its essential part is one of the most common aromatics in the Mediterranean kitchen. It is one of the popular spices regularly used as a flavoring agent. Cumin is an annual cultivated herb, with an erect, round, slender, branched stem, about a foot high.²

The available and useful parts of cumin plants are described below:

Leaves: The leaves of cumin are multi-fid, with long filiform segments.

Flowers: The flowers, small, white, or pink are overtopped by the bracts, which, after flowering, are reflexes. The umbels, both partial and general,

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History

- Submission Date: 27-02-17;
- Review completed: 20-03-17;
- Accepted Date: 22-03-17

DOI : 10.5530/pj.2017.3.51

Article Available online

<http://www.phcogj.com/v9/i3>

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Cite this article: Singh RP, Gangadharappa HV, Mruthunjaya K. *Cuminum cyminum* – A Popular Spice: An Updated Review. Pharmacogn J. 2017;9(3):292-301.

consist of about 5 rays, with the involucre consisting of 2 or 3 filiform, 1-sided bracts.

Fruits: The fruits of cumin are ovate or fusiform, of a light brown or grayish color. The fruit resembles caraway, but is larger and about 2 lines in length, much longer than the pedicels, nearly tapering, but little contracted at the sides, fusiform, crowned by the short teeth of the calyx, densely covered with short rough hair upon the channels, and less densely upon the ridges, which are paler, filiform, and a little raised; The seeds or half fruits, 2 in number, are oblong; Plano convex, with the plane surfaces together (L.). The odor and taste of cumin fruit is similar to caraway, but it's so warmer and not so agreeable.

Seeds: The cumin seed is yellow to brownish-gray in color and is elongated in shape with nine protuberances that possesses numerous medicinal properties. The seeds of cumin are carminative, aromatic, stomachic, stimulant, astringent and cooling and synergistic⁴ in effect. Cumin seed oil is used as multifunctional luminescent paints or in topical clothing ointment.

Cumin is an aromatic herb and an astringent that benefits the digestive apparatus. It has been used in the treatment of mild digestive disorders as a carminative and eupeptic, as and astringent in broncho pulmonary disorders and as a cough remedy, as well as an analgesic.⁵

The essential oil of cumin seeds has shown a significant antibacterial activity against *K. pneumoniae in vitro*.⁶

OTHER FRUITS OF APIACEAE FAMILY

There are many fruits from the same family that have the similar appearance and properties. There is Persian cumin or meridian fennel for caraway, black cumin for nigella, and sweet cumin for aniseed or fennel, as a general rule interprets jeera or zeera (jira, zira) as cumin and kalonji as nigella. The similarity in odor or appearance (Figure 1), biological name and uses of the members of Apiaceae family is shown in Table. 1.

Caraway

Caraway (*Carum carvi L.*) Figure 2, is defined as the dried ripe fruit of the biennial, usually white-flowered, aromatic herb. It is also known as

Persian cumin or meridian fennel, and is one of the ancient cultivated plants of Asia, Africa and Europe.⁷ The plant resembles a carrot plant with feathery leaves and threadlike divisions, growing on 20-30 cm (7.9-11.8 in) stems and the flower stem is tall, slender, branched, and hollow-stemmed, 30-80 cm (16-24 in) in height. A large number of phytoconstituents including different flavonoids, iso-flavonoids, flavonoid glycosides, monoterpenoids such as carvone and its derivatives, glucosides, lignins, and alkaloids, as well as polyacetylenic compounds,⁸⁻¹² different vitamins, amino acids, proteins, and minerals, also starch, sugars and other carbohydrates, tannins, phytic acid, and dietary fibers¹³ are present in caraway. Carvone and limonene are usually reported as the main phytochemicals present in caraway seeds. The other important compounds extracted usually from hydro/steam distillation include: carvacrol, α -pinene, g-terpinene, linalool, carvenone, and p-cymene.¹⁴⁻¹⁶

The fruits of caraway are used extensively as a mild spice and flavoring for culinary purposes in many cuisines. The dried, brown fruits are hard, crescent-shaped achenes, around 2 mm long with five pale ridges. The fruits are similar to cumin which has a pleasant odor, and an aromatic flavor and sharp taste. In Middle East countries they are distinguished by their color; caraway is known as black zeereh and cumin seeds known as green zeereh.¹⁷ Caraway seeds are also widely used in various systems of traditional medicine and the aromatic constituents have been studied for their health benefits.

Treatment and Uses of caraway

Caraway is well known as a traditional medicinal plant with a long history of healing. Cumin has reported to have potent medicinal properties such as antispasmodic, antiseptic, antiparasitic, lactigenic, hypolipidemic, antifatulence, aromatic, carminative, digestive and stimulant. It is also recommended for the treatment of toothache, diarrhea, and epilepsy.¹⁷

Black cumin

Black cumin (*Bunium persicum*) Figure 3, is also popular as wild or shahi jeera in the Persian and Indian subcontinent and it is related appearance of regular cumin. Its seeds feature long, slender, curved, dark brown pods with distinctive earthy flavor. *Nigella sativa Linn.* (N. sativa), it's also

Table 1: Appearance and properties of the Apiaceae family members

Biological name	Common name	Other names	Active constituents	Uses
<i>Carum carvi</i>	Caraway seed, caraway fruit, persian cumin, meridian fennel	Jiraa, zeera siyaah, kamoona, kamoona-roomi	Carvone, limonene carvacrol, α -pinene, g-terpinene, linalool, carvenone, and p-cymene	Antispasmodic, antiseptic, antiparasitic, lactigenic, hypolipidemic, aromatic, carminative, digestive, stomach-calming and stimulant
<i>Bunium persicum</i>	Black cumin, black seed, Nigella sativa	Jirak, jiraa siyah, kamoonaarmani, shahi jeera, kaala jeera	Nigellone and thymoquinone	Hypotensive, uricosuric, choleric, antifertility, antidiabetic, antihistaminic, anti-oxidant, anti-inflammatory, anti-microbial, anti-tumor
<i>Cuminum cyminum</i>	Cumin, Jeera	Safed jeeraa, kamun	b-pinene, p-cymene, g-terpinene, and cuminaldehyde	Carminative, eupeptic, astringent, antibacterial, cough remedy and analgesic
<i>Pimpinella anisum</i>	Anise, aniseed, sweet cumin	Saumph, aneesun, anisum, anise seed, anisi, anisi fructus, anisi vulgaris	trans-anetole, estragole γ -hymachalen, para-anisaldehyde and methyl cavicol	Antiseptic, antifungal, antispasmodic, tonic, appetizer, stimulator and carminative, perfumery agent, dentifrice and mouthwash.
<i>Foeniculum vulgare</i>	Sweet cumin, sweet fennel	Perum jeerakam, fenicol, fenikel, fenkel, fenkhel, fenkoli, fennel oil, saunf, shamaar, sombu, sonf, sopu, spice of the angels	Anethole, α -pinene, β -myrcene, β -pinene, fenchone, camphene, estragole, fenchone, limonene, p-cymen, and safole	Carminative, cold, cough and cattle condiment

known as black seed or black cumin, is an herbaceous plant, generally grows in the Middle East, Central Europe and Western Asia, used as food seasoning in the Mediterranean region. It is commonly used in indigenous system of medicine and in Arab traditional medicine for treatment of various disorders such as arthritis, lung diseases and hypercholesterolemia for over 2000 years.¹⁸⁻²⁰ Other pharmacological properties of it includes hypotensive, anti-nociceptive, uricosuric, choleric, antifertility, anti-diabetic, anti-histaminic, anti-oxidant, anti-inflammatory, anti-microbial, anti-tumor and immunomodulatory effects.²¹ The rich component of its nigellone and thymoquinone, about 27%-57% and has numerous medicinal values.²²⁻²⁴

The fruits of black cumin are used in bread, rice, cheese and yogurt processing for its carminative, anti flatulent, antispasmodic and antimicrobial effects, besides the pleasant smelling characteristic. Fruits essential oil is usually used for losing weight and as lactagogue as well. The essential volatile oil of seeds of black cumin, contains more than sixty constituents that responsible for the pleasant fresh, clean, spicy (typical cumin-like) odour of a high quality product. Cumin aldehyde (36%), b-pinene (19.3%), p-cymene (18.4%) and c-terpinene (15.3%) are the principal compounds of cumin seed oils.

Treatment and Uses of black cumin

Black cumin is used in traditional medicine to treat headache, coughs, abdominal pain, diarrhea, asthma and rheumatism. The aqueous and oil extracts of the black cumin seeds have been shown to possess antioxidant, anti-inflammatory, anticancer, analgesic, antimicrobial activities and applications has in sanitary, cosmetic, agricultural and food industries. Black cumin seeds have been also used by patients to suppress coughs disintegrate renal calculi, retard the carcinogenic process,²⁵⁻²⁶ treat abdominal pain, diarrhea, flatulence and polio,²⁷ exert choleric and uricosuric activities, carminative, stimulatory and diaphoretic properties, anti-inflammatory^{28,29} and antioxidant effects.^{30,31} It is also used in the treatment of bronchial asthma and eczema.³²

Besides, the essential oil of black cumin was shown to have antihelminthic,³³ antinematodal,³⁴ antischistosomal,³⁵ antimicrobial³⁶⁻³⁸ and antiviral³⁹ and also headache, flatulence, blood homeostasis abnormalities, rheumatism and related inflammatory diseases effects.³²

Anise

Anise (*Pimpinella anisum*) Figure 4 is a dainty, white flowered herbaceous annual plant growing to 1.6 ft - 3 ft or more tall. The leaves at the base of the plant are simple, 1-5 cm long and shallowly lobed, while leaves

higher on the stems are feathery pinnate, divided into numerous small leaflets. The flowers are white, approximately 3 mm in diameter, produced in dense umbels. The fruit is an oblong dry schizocarp, aromatic and provided with 5 rows and 3-6 mm long in diachenium.^{8,40} Anise is very helpful in cold and cough, anemia, asthma, morning sickness, gas pain, sore throat and in bad breath. It is also used as antiseptic, antispasmodic, tonic, appetizer, stimulator and carminative. Essential oil of anise is used as perfumery agent in tooth paste and as a flavor for foods. The powdered form of anise is useful for dentifrice and mouthwash.⁴¹

Fennel

Fennel (*Foeniculum vulgare*) Figure 5 is a thick, perennial root-stock herb. It is erect and cylindrical, bright green, and grows to heights of up to 4 to 5 feet, with hollow branched stems. The leaves grow up to 40 cm long with the ultimate and finest segments filiform (threadlike), about 0.5 mm wide. The bright golden flowers are produced in terminal umbels 5–15 cm wide, each umbel section having 20–50 tiny yellow flowers on short pedicels. The fruit is a dry seed from 4–10 mm long, half as wide or less and grooved.⁸ Because of aromatic and carminative properties, Fennel is used as a food flavor ingredient. It is used for cold and cough in home remedy treatment and also largely used for cattle condiment.⁴²

CULTIVATION AND HARVESTING

Cumin is a small flowering herbaceous plant belonging in the Apiaceae, family, in the genus; *Cuminum*. The cumin plant flourishes well in sandy, fertile soil, assisted with hot summer weather conditions. It bears small, gray yellow, oblong shaped seeds with vertical ridges on their outer surface. It is cultivated in Arabia, India, China and in the countries bordering the Mediterranean Sea.⁴³ Cultivation of cumin requires a long, hot summer of 3–4 months, with day time temperatures around 30°C; it is drought tolerant, and is mostly grown in mediterranean climates. It is grown from seed, sown in spring, and needs fertile, well-drained soil.⁴⁴ Cumin seeds are used as a spice for their distinctive aroma, popular in Indian, Pakistan, North African, Middle Eastern, Sri Lankan, Cuban, Northern Mexican cuisines, and the Western Chinese cuisines of Sichuan and Xinjiang.⁴⁵ The cumin plant grows to 30-50 cm tall and is harvested by hand.⁴⁶

CHEMISTRY AND COMPOSITION

The cumin seeds contain aldehyde (60%) fats, amino acids, flavonoids and glycosides (22%), volatile oil (2-5%) and the yellow colored fresh oil contains cuminaldehyde as its chief component.^{47,48} The major



Figure 1: Similar appearance of family members of Apiaceae



Figure 2: Caraway (*Carum carvi* L.)



Figure 3: Black cumin (*Bunium persicum*)



Figure 4: Anise (*Pimpinella anisum*)



Figure 5: Fennel (*Foeniculum vulgare*)

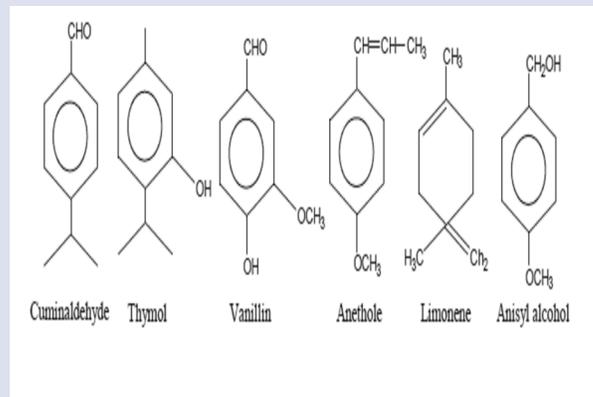


Figure 6: Structure of active compounds of cumin

compounds occurring in cumin are cuminaldehyde, limonene, α - and β -pinene, 1, 8-cineole, *o*- and *p*-cymene, α - and γ -terpinene, safranal and linalool has shown in Figure 6.

The cumin fruit contains resin, fatty matter, gum, lignin, protein bodies and salts, largely composed of malates, extractive, and volatile oil. The proximate composition of the seeds indicates that they contain fixed oil (approximately 10%), protein, cellulose, sugar, mineral elements and volatile oil.⁴⁹ Cumin seeds contain volatile oil (1–5%) that imparts the characteristic aroma to the seeds. After the separation, a plenty number of phenolic compounds are identified in cumin fruits that includes phenolic acids, flavonoids, phenolic diterpenes, that are closely associated with their antioxidant activity and play an important role in inhibiting lipid peroxidation and various types of oxidizing enzymes.⁵⁰

The identified essential oils in cumin are octanol, limonene, thymol, anisyl alcohol, cuminaldehyde, anethole, vanillin and also benzoic acid. The presenting organic acids in cumin are aspartic, citric, malic, tartaric, propionic, ascorbic, oxalic, maleic and fumaric acids and phenols are salicylic acid, gallic acid, cinnamic acid, hydroquinone, resorcinol, *p*-hydroxybenzoic acid, rutin, coumarin and quercetin. The cumin oil is used as a fragrance component in cosmetics (maximum use level 0.4% in perfumes).

Components of Cumin

The essential oil of cumin contains high levels of phenolic compounds, mainly cuminaldehyde, and *para*-cymene. The antioxidant activities of *b*-pinene, *p*-cymene, *g*-terpinene, cuminaldehyde and cumin oils (cumin oleoresin/COR, cumin essential oil/CEO, distillation residue/DR and distillate condensed from cold trap/CT). The two standard active constituent of cumin such as cuminaldehyde and *para*-cymene have used to protect liver against oxidative stress and disease by increases the enzyme activities and malondialdehyde.

Cuminaldehyde (4 - isopropyl benzaldehyde) is an aromatic monoterpene volatile compound and a constituent of the essential oils of eucalyptus, myrrh, *Cuminum cyminum*,³ *Carum carvi*,^{8,47} *Cinnamomum cassia*⁵¹ and others.^{8,17} Cuminaldehyde has molecular formula $C_{10}H_{12}O$ that is a substitute of benzaldehyde with an isopropyl group in the 4th position. It has pleasant aroma and has been used commercially in perfumes and cosmetics. The molecular weight of this colorless compound is 148.2 g mol^{-1} .³

Cuminaldehyde can be synthesized by two methods:

1. By the reduction of 4-isopropylbenzoyl chloride
2. By the formylation of cumene.

Cuminaldehyde is used commercially in perfumes and other cosmetics. It is also used to inhibit the fibrillation of alpha-synuclein (α -SN),⁵² Parkinson's disease and viral infections.

Cuminaldehyde has shown different effects such as anti-platelet,⁵³ antibacterial,³ antifungal,⁵⁴ anti-diabetic,⁵⁵ anti-Parkinson's⁵⁶ and it also activates salivary glands in mouth and facilitates the primary digestion of the food and produce carminative effects. Cuminaldehyde has been under study to verify its effectiveness as an antitumor agent and has shown good results on cultured murine but not on cultured human cells. Paracymene is a cyclic organic compound with the molecular formula $C_{10}H_{14}$. This compound belongs to alkyl benzene group and is related to monoterpene. Its structure contains a benzene ring with two methyl isopropyl groups. Para-cymene is insoluble in water but soluble in ethanol. The molecular weight of this colorless compound is $134.21 \text{ g mol}^{-1}$.⁵⁷

Another important component of cumin is thymol that has the molecular formula $C_{10}H_{14}O$ and molecular weight $150.22 \text{ g mol}^{-1}$. The secretion of acids, bile and enzymes by thymol is same as to the gland and play an important role in as stimulator.

NUTRITIONAL PROFILE OF CUMIN

Cumin seeds contain numerous phytochemicals that are known to have antioxidant, carminative and antifatulent properties. The seeds are an excellent source of dietary fiber. Its seeds contain certain health benefits essential oils such as cuminaldehyde (4-isopropylbenzaldehyde), pyrazines, 2-methoxy-3-sebutylpyrazine, 2-ethoxy-3-iso propylpyrazine, and 2-methoxy-3-methylpyrazine. The active principles in the cumin may improve gut motility and help in digestion.^{58,59} As per USFDA, the nutritional profile of cumin is given below in Table 2.

HEALTH BENEFITS OF CUMIN

Cumin has the following benefits that are described below:^{58,59}

Common benefits

Cumin used in healing the cuts and bleeding and as an antiseptic. Cumin is a stimulant as well as a great herb for digestive disorders, stimulate the secretion of enzymes from the pancreas which can help absorb nutrients into the system, boost the power of the liver's ability to detoxify the human body, anticarcinogenic properties, reduce the risk of stomach and liver tumors and also boost immune system. Cumin also has the useful benefit effects such as increasing urine flow, settling upset stomach, eliminating gas, and improving the symptoms of carpal tunnel syndrome.

Iron for Anemia and Immune Function

Cumin is very rich in iron (above 66 mg. in each 100 grams) which is more than 5 times the daily requirement of iron for an adult. Cumin seeds are a very good source of iron and minerals that plays many vital roles in the body. Iron is an integral component of hemoglobin, which transports oxygen from the lungs to all body cells, and is also part of key enzyme systems for energy production and metabolism. So, cumin can be a nutritious additive to daily diet for anemic people. Additionally, iron is instrumental in keeping your immune system healthy.

Lactation

It is rich in iron and thus very good for lactating mothers as well as women who are undergoing menses or who are pregnant, since they are more in need of iron than others. Iron is particularly important for menstruating women, who lose iron during menses. Growing children and adolescents have increased needs for iron, as do women who are pregnant or lactating. Moreover, cumin is said to help ease and increase secretion of milk in lactating women due to presence of thymol, which tends to increase secretions from glands, including milk which is a secre-

tion from mammary glands. It is more beneficial if taken with honey. Cumin has remarkable amount of calcium (above 900 mg per 100 g) which accounts to over 90% of our daily requirement of calcium. This calcium is an important constituent of milk and hence cumin is very good for lactating mothers.

Skin Disorders

Almost all of us know that vitamin E is good for skin. It keeps the skin young and glowing. This vitamin is also present in abundance in cumin. The essential oils present in this have disinfectant and anti fungal properties. This prevents any microbial and fungal infection from affecting the skin.

Boils/Removal of toxins

Boils are just outlets for removal of toxic substances and foreign matters such as microbes etc. from the body. So, they are rather symptoms which show that a lot of toxic substances have accumulated in the body. Those who regularly use cumin in food have been seen keeping free from boils, rashes, pimples etc. Components such as cuminaldehyde, thymol, phosphorus etc. are good detoxicants which help in the regular removal of toxins from body, through excretory system of course, and not through boils.

Other benefits

Cumin is also beneficial in treating renal coli, weak memory or lack of concentration, insect bites and sting etc.

USES OF CUMIN

General uses

Cumin seeds are used in cooking to flavor food also as a spice. The components of cumin may have antioxidant, anticancer, antibacterial, and larvicidal effects. It is also used to lower blood sugar, reduce seizures, strengthen bones, and treat the eye.

Traditional uses

Traditional uses of cumin include reducing inflammation, increasing urination, preventing gas and suppressing muscle spasms. It is also used as an aid for indigestion, jaundice, diarrhea, and flatulence, poultice and suppository, and has been taken orally. Cumin is a major component of curry and chili powders that used to flavor a variety of food products. It is used to flavor alcoholic beverages, desserts, and condiments. Cumin also used as a fragrant component of creams, lotions, and perfumes. In different traditional systems, cumin is considered as stimulant, carminative and astringent, abortive, galactagogue, antiseptic, antihypertensive herb, bitter tonic, and purgative and its therapeutic effects have been described on gastrointestinal, gynecological and respiratory disorders, and also for the treatment of toothache, diarrhea and epilepsy.⁵⁹⁻⁶²

Pharmacological Uses

Cumin and its active constituents used as a antibacterial, antifungal, anti-inflammatory, antioxidant, astringent, atherosclerosis (hardening of the arteries), blood thinner, bone loss, cancer, cardiovascular disease, carpal tunnel syndrome, cataracts (eye disease), cavities, dental plaque, diabetes, digestion, diuretic (improves urine flow), ear infections, food uses (flavoring and preservative), gas, gastrointestinal disorders, general health maintenance, general stimulant, high cholesterol, immune modulation (affects the immune system), insect repellent, insecticidal, low blood sugar, menstrual flow stimulant, promoting flow of breast milk, relaxation, seizures/epilepsy, ulcers, weight loss. The pharmacological activities or uses of cumin are described below:

Table 2: Nutritional Profile of Cumin

Types of Nutrient	Examples of nutrient	Applications	Nutrient Value	Percentage of RDA
Minerals	Iron	Required for red blood cell formation	66.36 mg	829 %
	Copper	Required in the production of red blood cells	0.867 mg	96 %
	Calcium	---	931 mg	93 %
	Manganese	Used by the body as a cofactor for the powerful antioxidant enzyme, superoxide dismutase	3.3 mg	145 %
	Selenium	---	---	---
	Zinc	Zinc is a cofactor in many enzymes that regulate growth and development, digestion and nucleic acid synthesis	4.8 mg	43.5 %
Electrolytes	Potassium	It's an important component of cell and body fluids that helps controlling heart rate and blood pressure	68 mg	11 %
	Sodium	---	1788 mg	38 %
Vitamins	Vitamin (B complex)	Anti-oxidants	0.628 mg	52 %
	Thiamin		0.32 mg	24.5 %
	Riboflavin		4.58 mg	28.5 %
	Niacin		0.435 mg	33 %
	Pyridoxine		10 µg	2.5 %
	Folic acid			
	Vitamin E	Anti-oxidants	3.3 mg	22 %
	Vitamin A		7.7 mg	13 %
Phyto-nutrient	Vitamin C		1270 IU	42 %
	Vitamin K		5.4 µg	4.5 %
	Carotenes	Anti-oxidants	762 µg	-
	Zeaxanthin		0 µg	-
Others	Lutein		448 µg	-
	Energy	---	375 Kcal	19 %
	Carbohydrate		44.24 g	24 %
	Protein		17.8 g	32 %
	Fat		22.27 g	74 %
	Fibers		10.5 g	26 %
	Cholesterol		0 mg	0 %

Antioxidant

The cumin oils have high antioxidant activity due to presence of mono-terpene alcohols, essential flavours, flavonoids and other poly-phenolic molecules.⁶³⁻⁶⁷

Antimicrobial

The antimicrobial action of cumin both oil and aqueous has assessed against a wide range of valuable and pathogenic gram-positive and gram-negative microbial strains. Cumin seed oil and alcoholic extract inhibited the growth of *Klebsiella pneumoniae* and its clinical isolates and caused improvement in cell morphology, capsule expression and decreased urease activity. Cumin has also found the biofilm-formation preventive properties against *Streptococcus mutans* and *Streptococcus pyogenes*.⁶⁸⁻⁶⁹ Cumin has shown the anti-fungal activity against food, soil, animal and human pathogens, yeasts, aflatoxins and mycotoxin producers.^{63,70-78}

Anticarcinogenic/antimutagenic

The dietary supplements of cumin have prevented the occurrence of rat colon cancer induced by a colon-specific carcinogen and also decrease the activity of β -glucuronidase and mucinase enzymes. In cumin-colon treated rats, the levels of cholesterol, cholesterol/phospholipids ratio and

3-methylglutaryl COA reductase activity were reduced.^{79,80} The other inhibition activities of dietary cumin in mice are benzopyrene-induced for stomach tumorigenesis, 3-methylcholanthrene induced uterine cervix tumorigenesis, and 3-methyl-4-dimethylaminoazobenzene induced hepatomas.

Antidiabetic

Oral administration of cumin showed hypoglycemic effect in normal rabbit, resulting in significant decrease in the area under the glucose tolerance curve hyperglycemic peak.⁸¹ The biologically active constituent cuminaldehyde inhibited aldose reductase and alpha glucosidase isolated from rat.⁸² In hyperlipidemia, when administered cumin by orally to alloxan induced iabetic rats, reduced the body weight, plasma and tissue cholesterol, phospholipids, free fatty acids and triglycerides and also decreased aspartate transaminase (AST), alkaline phosphatase (ALP) and γ -glutamyl transferase (GGT) activities and decreased the tissue (liver and kidney) levels of cholesterol, triglycerides and phospholipids.

Immunomodulatory

The oral treatment of cumin stimulated the T cells (CD4 and CD8) Th1 cytokines' expression in normal and cyclosporine-An induced immune suppressed animal. Cumin also depleted T lymphocytes, decreased the

Table 3: Interaction and Side effect of Cumin

Sr no	Plant or Active constituents	Interactive Drug/Herb	Alter the effects
1	Cumin	Ginkgo biloba, Garlic, Aspirin, Warfarin, clopidogrel (Plavix [®]), ibuprofen (Motrin [®] , Advil [®]), naproxen (Naprosyn [®] , Aleve [®])	Increase the risk of bleeding
2	Cumin	Antibiotics, anticancer drugs, antifungals, anti-inflammatory agents, antiseizure agents, cholesterol lowering and lipid lowering agents, drugs used for osteoporosis, estrogens, gastrointestinal agents, morphine, opioids, and phytoestrogens	Affect the immune system
3	Cumin	Glimepiride (Amaryl), glyburide (DiaBeta, Glynase PresTab, Micronase), insulin, pioglitazone (Actos), rosiglitazone (Avandia), chlorpropamide (Diabinese), glipizide (Glucotrol), tolbutamide (Orinase)	Decrease the blood sugar level
4	Cumin	Anti-tuberculosis drugs	Enhanced rifampin levels
5	Cumin	Cytochrome P450	Increase the blood sugar level

elevated corticosterone levels and size of adrenal glands and increased the weight of thymus and spleen in stress induced immune suppressed mice.⁸³

Central nervous system

The administration of cumin oil decreased the frequency of spontaneous activity induced by maximal electroshock and pentylenetetrazol (PTZ) in mice in time and concentration dependent and increased duration manner.⁸⁴ Cuminaldehyde has tyrosinase inhibitor property that prevented the oxidation of l-3,5- dihydroxyphenylalanine (l-DOPA).⁸⁵

Estrogenic/anti-osteoporotic

The presence of phytoestrogens in cumin has shown the anti-osteoporotic effect of reduced the urinary calcium excretion, augmentation of calcium content and mechanical strength of bones.⁸⁶

Other biodynamic actions

Cumin has shown antitussive and produced relaxant effect by stimulating beta-adreno receptors and/or histamine H1 receptors. It has also shown antiaggregatory activity and inhibition of eicosanoid synthesis by inhibited arachidonic acid (AA)-induced platelet aggregation, thromboxane B2 production from exogenous AA and simultaneous increase in the formation of lipoxigenase.^{1,87}

Bioavailability enhancer

The bioenhancer flavonoid glycoside 3', 5-dihydroxyflavone 7-O-β-d-galacturonide- 4'-O-β-d-glucopyranoside of cumin has shown a significant enhancement of rifampicin levels in rat plasma through the enhancement of peak concentration (C_{max}) and area under the curve (AUC) of rifampicin by 35 and 53%, respectively, when co-dosed with this molecule.^{88,89}

SIDE EFFECTS AND WARNING

Cumin is a traditional and herbal plant that has various useful and curable effects but it also has some side effects. Side effects of cumin include contact dermatitis (skin rash from contact with an allergen or irritant), respiratory reactions, and liver cancer (above dietary levels), and lower blood sugar levels and also increase the risk of bleeding.⁵⁸

A patient who suffers from ulcer and liver problems and also in women who are pregnant or breast feeding, they should have to use cumin with caution. Patients should also have to use cumin with caution who taking agents that affect the immune system, antibiotics, anticancer drugs, anti-fungal, anti-inflammatory agents, antioxidants, anti-seizure agents, cholesterol lowering and lipid lowering agents, estrogens, gastrointestinal agents, insecticides, iron, morphine, opioids, osteoporosis agents, painkillers, and phyto-estrogens. Cumin may alter the following effects, when used with specific drugs (Table 3).

CONCLUSION

Cuminum cyminum L., commonly known as cumin is a traditional, herbaceous plant and very popular spice since ancient times. Appearance and properties of apiaceae family member anise, fennel, caraway and black cumin were described similar to cumin fruits. Cumin was an icon for love and fidelity from middle ages. Cumin used as a flavoring agent to flavor the food and beverage and for pungency taste. According to the nutritional profile, cumin had a carbohydrate, protein, fat and soluble dietary fibers along with vitamins such as thiamine, riboflavin and niacin. It was also a rich source of iron and minerals, having Fe²⁺ (6.0) and Zn²⁺ (6.5) (mg/100 g) that is useful to generate energy, immune systems and for skin disorders. Cumin has shown a lot of effects either as general use or pharmacological effects. Some side effects of cumin are also indicating the caution with therapeutic drugs but still it is a popular and nutrient contained spice in recent times.

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Cite this article: Singh RP, Gangadharappa HV, Mruthunjaya K. *Cuminum cyminum* – A Popular Spice: An Updated Review. Pharmacogn J. 2017;9(3):292-301.