

**INTERNATIONAL JOURNAL OF UNIVERSAL
PHARMACY AND BIO SCIENCES****IMPACT FACTOR 4.018*******ICV 6.16*******Pharmaceutical Sciences****Review Article.....!!!****CUMINUM CYMINUM – A REVIEW BASED UPON ITS TRADITIONAL USES****Manish Grover***

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ABSTRACT**KEYWORDS:**

Ayurveda and Siddha systems of medicine, Medicinal Plant for Aromatherapy and various Ailments.

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Culinary herbs and spices have been used in medical practices since ancient times. The main purpose of spices is flavoring and preserving the food. Cumin is the second most popular spice in the world. It is widely used as a medicinal plant for aromatherapy and various ailments. The traditional spice much used in the Ayurveda and Siddha systems of medicine. Cumin seeds are rich sources of essential oils containing a diverse group of phytochemicals in which Cuminaldehyde is the active constituent associated with many biological activities. Cumin has proved several benefits with the help of the availability of nutrients. Many pharmacological effects have been reported from this spice i.e. anti-diabetic, Immunological, anti-epileptic, anti-tumor and antimicrobial. The present study has summarized the general description, phytochemical constituents, traditional and modern usages and pharmacological activities of the *Cuminum cyminum* plant.

INTRODUCTION:

Spices are considered beneficial for both food ingredients and nutritional supplements for centuries. From the past many years, it has been used as food additives to enhance the flavor and taste of food. Spices also possessed numerous therapeutic properties. According to Ayurveda pharmacopeia (Indian System of medicine), spices are used to treat several diseases^[1]. Cumin is one of the popular spice used in folklore therapy because of its aroma fragrance and medicinal values. *Cuminum cyminum L.* (Figure 1) is one of the old cultivated herb in Asia which belongs to the Apaiaceae family. The plant is also named Cumin in English and Jeera in Hindi^[2-3]. The scientific name of *Cuminum cyminum L.* (cumin) is also referred as *Cuminum odorum Salisb*, *Cuminia cyminum J.F. Gmel*, *Cuminum hispanicum Bunge* and *Ligusticum cuminum (L) Crantz*. The seeds of this plant are generally used for medicinal or culinary purposes. The plant contains various phytochemicals such as cuminaldehyde, limonene, eugenol, α - and β -pinenes and some others. Cuminaldehyde is the principal compound of the cumin plant. Many studies have been reported the medicinal usage of *Cuminum cyminum* like anti-diabetic, Immunology, anti-epileptic, anti-tumor and antimicrobial, etc. This plant also plays a major role in veterinary medicine^[4]. The plant possesses several medicinal properties in a different system of medicine like Ayurveda, Siddha and homeopathic system^[5]. In Iranian traditional medicine, cumin seeds were used for their therapeutic effects on gastrointestinal, gynecological and respiratory disorders. This spice is an excellent source of minerals like iron, copper, calcium, potassium, manganese, selenium, zinc and magnesium. It also contains B-complex vitamins such as thiamin, vitamin B-6, niacin, riboflavin and other vital anti-oxidant vitamins like vitamin E, vitamin A and vitamin C. It is also utilized in a variety of commercial food products. It has been crushed and mixed with foods such as meat, fish and bread. The oil extracted from the cumin is utilized to flavor alcoholic beverages, desserts and condiments. Commercially, it is also used in creams, lotions and perfumes because of its aroma fragrance^[6]. In Europe, it was too popular and become an icon of love and fidelity^[7]. Many studies reported the therapeutic usage of cumin. Cumin can also increase the hemoglobin level in the body^[8]. The vernacular names and taxonomical classification of *Cuminum cyminum* are given in table no.1 and 2 respectively.

Table 1. Vernacular names of *Cuminum cyminum L.*

Arabic	Kamonabaize, Kamoon, kamoon Asfar, Kamun, Zirah saraid
English	Cumin
Hindi	Garjar, Jeera, Jira, Safed jeera, Safed-zara, Saphed jira, shiajira, Zeera, Zira, Zirah
Kannada	Jeera, Jeeraka, Jeerigay, Jeerige, Jirage, Jiringe
Malayalam	Cheerakam, Jeerakam, Jirakam
Marathi	Jeera, Jeeram, Jiregire
Persian	Zira, Zirah, Zira safed, Zira sufaid
Sanskrit	Ajaji, ajajika, ajmoda, dipaka, dipya, dipyaka, dirghajiraka, hrasvanga, jaji, jarana, jaranam, jeeraka, jira, jiraka, jirakah, jirakaha, jirakam, jirakataila, jirana, jirna, kana, kanavha, kunchika, Magadha, mitadipya, mitajaji, shuklajaji, svetajiraka, vahmisakha
Tamil	Acai, acaiyu, acanaveti, attimai, cheerakam, cicari, ciraciram, cirakacceti
Telugu	Jeelakara, jilakara, jilakarra, jiraka, jirana, zeela-karra
Urdu	Safaid zira, zeerasafed, zira safaid, zira safaid bariyan, zira safed

Table 2. Taxonomical Description of *Cuminum cyminum L.*

Taxonomical Rank	Taxon
Kingdom	Plantae
Phylum	Spermatophyta
Class	Dicotyledonae
Order	Apiales
Family	Apiaceae
Genus	Cuminum
Species	<i>Cuminum</i>



Figure 1. *Cuminum cyminum* (Jeera)

Botanical Description of *Cuminum cyminum*

Cuminum cyminum is an annual herbal plant that is up to 15-50cm long somewhat angular and tends to droop under its weight. Roots are long and white. Leaves are alternate, simple, and have a sheathing leaf base below. Flowers are small, pink and borne in umbels or umbrella-like clusters. The flowers are bisexual in nature. An inferior ovary develops into a very characteristic fruit called a cremocarp. The fruit is an elongated, oval-shaped schizocarp (an aggregate fruiting body that doesn't break open naturally and has two single-seeded units called mericarps). The fruits are the same as funnel seeds^[9-10].

Geographical Distribution of *Cuminum cyminum*

Cuminum cyminum is widely distributed throughout America, Africa and all over Asia. China and India are the main producers of cumin. It produced 70% of world supply and consumes 90% of that. Mexico is another major producer. In total, 300,000 tons of cumin per year are produced worldwide^[11].

Phytochemical Constituents of *Cuminum cyminum*

All the major phytochemicals are isolated from the cumin seeds. The cumin seeds contain aldehyde (60%) fats, amino acids, flavonoids and glycosides (22%), volatile colored fresh oil contains Cuminaldehyde as its chief component^[12-13]. The compounds present in cumin are cuminaldehyde, limonene, α - and β -pinene, 1,8-cineole, o- and p- cymene, α - and the γ -terpinene, safranal and linalool. The cumin fruit contains resin, fatty matter, gum, lignin, protein bodies and salts, largely composed of malates, extractive and volatile oil. Seeds are composed of various compounds i.e. fixed oil (about 10%), protein, cellulose, sugar, mineral elements and volatile oil (1-5%)^[14]. The volatile oil is responsible for the aroma of seeds. Various phenolic

compounds that include phenolic acids, flavonoids, phenolic diterpenes are isolated from the cumin fruits [15]. 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. Aldehyde and para-cymene are high levels of phenolic compounds. Two standard active constituents of cumin such as cuminaldehyde and para-cymene have been used to protect the 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 major constituent of essential oils of various plants including *Cuminum cyminum* [16-19]. Cumin seeds contain certain health benefits essentials oils such as cuminaldehyde (4-isopropyl benzaldehyde), pyrazines, 2-methoxy-3-secbutylpyrazine, 2-ethoxy-3-iso propylpyrazine and 2-methoxy-3- methylpyrazine. The active principles in the cumin may improve gut motility and help in digestion [20-21]. Some major phytochemicals of *Cuminum cyminum* are shown in figure no. 2.

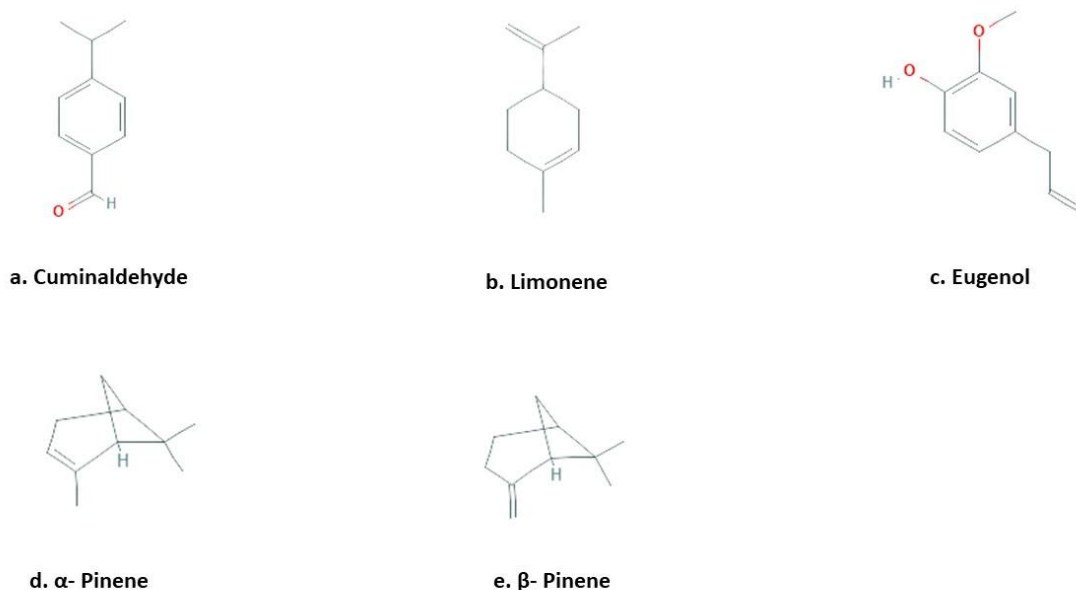


Figure 2: Structure of some major phytochemicals of *Cuminum cyminum*

Traditional and Modern View

A. Folk View: Many medicinal herbs are used in many forms in traditional therapy. The literature revealed that cumin seeds are prominently considered carminative, eupeptic, antispasmodic, astringent and used in the treatment of mild digestive disorders, diarrhea, dyspepsia, morning sickness, colic, dyspeptic headache, bloating and other liver diseases [22-

^{23]}. Cumin has been used for the treatment of toothache, diarrhea and epilepsy by the folks in Iran ^[24]. The medicinal usage of cumin and caraway seeds has been widespread in ethnomedicinal systems from Northern Europe to Mediterranean regions, Russia, Iran, Indonesia and North America. Cumin is considered as an abortifacient, antiseptic, antihypertensive herb by Tunisia's traditional system. In Italy, it is utilized as a bitter tonic, carminative and purgative ^[25-26]. Cumin seeds are used as a stimulant, carminative and prescribed for gonorrhea, chronic diarrhea and dyspepsia by the Arabians. Cumin seeds powder mixed with honey, salt and butter was applied to scorpion bites ^[27].

B. Ayurvedic View: Cumin is also known as 'Jeera' in Hindi and 'Jeeraka' in Sanskrit. This word Jeerna is derived from jeerna which means digestion. Therefore, the word Jeeraka means which digests. This plant is very beneficial in treating digestive tract disorders. It is a spice which is used in every Indian kitchen. It is basically used for taste and aroma. As per Ayurveda, Jeera is capable of reducing Vata and Kapha dosha (disorders) and increases pitta dosha in the body. It is also utilized in the treatment of various ailments like indigestion, dysentery, enlarged spleen, flatulence and vomiting ^[28-29]. Ayurvedic properties (Rasa Panchak) of cumin (Jeera) are mentioned in table no 3.

Table 3: Rasa Panchak of Cumin (Jeera)

Sanskrit/English	Sanskrit/English
Rasa/Taste	Katu/Pungent
Guna/Physical Properties	Laghu, Rooksha/Light,Dry
Virya/Potency	Ushna/Hot
Vipaka/Metabolic Property	Katu/Pungent

In Ayurveda, Jeera is categorized by two popular physicians i.e. Charaka and Sushruta. Jeera is categorized as shoolaprashamana (herbs that relieve abdominal pain) by Charaka, while Sushruta mentioned it as Pippalyadi. According to Bhojana kutuhalam, it is mentioned as sambhara which helps in treating vomiting, diarrhea, gulma, colicky pain, any abdominal disorders, intestinal worms and dental problems.

Various Ayurvedic Medicinal Properties of Cumin are ^[30]:

Ruchya- It helps in improving the taste.

Deepana, Agnivardhana- It is potent for improving digestion

Grahi, Sangrahi- It is used in malabsorption syndrome and diarrhea.

Medhya- It acts as a brain tonic and improves intelligence.

Garbhashaya Vishuddhikrut- It is helpful in cleaning and detoxifying uterus. It is widely utilized in the postpartum care of the mother.

Jvaraghna- It is an antipyretic agent.

Chakshushya- It improves vision and beneficial for the eyes.

Abhiyantranadi Sansthan- It works on the digestive system and increases metabolism. It is used to treat liver disorders, worm infections and stomach pain.

Diet plays a vital role in the maintenance of reproductive powers. A study reported that cumin in the diet boosts fertility in females ^[31].

The Indian AYUSH ministry was given certain measures for boosting immunity to fight against Covid-19. The three major instructions are 1. Drink warm water throughout the day, 2. Practice yoga daily and 3. Spices like Haldi (Turmeric), Jeera (Cumin), Dhaniya (Coriander) and Lahsun (Garlic) are recommended in cooking ^[32].

Various Ayurvedic formulation of Cumin (Jeera) are:

Hingwastak Churna, Dhatri Pasayan, Jeerakarishitam, Yogaraj Guggul, Jirakidyarishtha, Hinguvacidi Churna, Attatic Curanam, Cirakac Curanam, Cirakat Tailam, Kecari Ilakam, Mayilirakatic Curanam, Panca Tipakkinic Curanam, Pitta Curak Kutinir.

Modern View: The consumption of ayurvedic medicines has increased nowadays world widely. Reported studies have revealed an increased growth in the sale of herbal products from the year 2000 to 2018 ranges from 3% to 12% per year ^[33]. Due to the increased demand for herbal products, the risk with herbal medicines also rises. The quality of the end product compromises because of the contamination of raw material with toxic metals microbes, other residues and adulteration which results in the poor quality of medicinal products ^[34]. Internal issues like non-uniformity and complexity in the ingredients of herbal medicines are also raised which affects the quality of herbal medicines ^[35]. Lack of standardization technique for herbal products is also responsible for the poor quality of drugs because of the failure to detect the original drug which exploits its usage in the conventional system of medicines ^[36]. The development of new dosage forms without affecting the principal component is the present-day need. Many formulations like oil, creams and seed packet are produced from the plant *Cuminum cyminum*. Cumin seeds have its medicinal value due to which it is used for the treatment of rheumatism in humans.

Reported Pharmacological and Therapeutic Properties of *Cuminum cyminum*

Antimicrobial Activity: Derakhshan et al., reported the antimicrobial activity of both oil and aqueous extract of cumin against a wide range of pathogenic gram-positive and gram-negative microbial strains. Cumin seed oil and alcoholic extract both, inhibited the growth of *Klebsiella pneumonia* ^[37]. Shayegh et al., reported antimicrobial activity and biofilm-formation preventive

properties of *Mentha piperita* and *Cuminum cyminum* essential oils and chlorhexidine against *Streptococcus mutans* and *streptococcus pyogenes* [38]. Hajlaoui et al., reported antibacterial and antifungal activity of cumin oil against *Vibrio Spp. Strains* [39]. Boyraz et al., evaluated antifungal effects of rosemary, cumin, basil and pickling herb hydrosols against *Rhizoctonia solani*, *Fusarium oxysporum F sp tulipae*, *Botrytis cinerea* and *Alternaria citri* [40].

Anticarcinogenic Activity: Srinivasan et al., reported anticarcinogenic effects of dietary supplements of cumin in colon-induced rats. The result showed that the levels of cholesterol, cholesterol/phospholipids ratio and 3-methylglutaryl COS activity was found to be reduced in cumin-colon-treated rats. The other inhibition activities of dietary cumin in mice are benzopyrene-induced stomach tumorigenesis, 3-methylcholanthrene induced uterine cervix tumorigenesis and 3-methyl-4-dimethylaminazobenzene induced hepatomas [41].

Antidiabetic Activity: Raman et al., reported the antihyperglycemic effect of 12 edible plants includes cumin in 27 healthy rabbits. The result showed *Tolbutamide*, *Cucurbita ficifolia*, *Phaseolus vulgaris*, *Opuntia streptacantha*, *Spinacea oleracea*, *Cucumis sativus* and *Cuminum cyminum* decrease significantly the area under glucose tolerance curve and the hyperglycemic peak [42]. Lee et al., reported antidiabetic activity of *Cuminum cyminum* seed-isolated compound against lens aldose reductase and α -glucosidase isolated from Sprague-Dawley male rats [43]. Cuminaldehyde is found to be beneficial as a lead compound and a new agent for antidiabetic therapeutics.

Central Nervous System: Sayyah et al., reported anticonvulsant activity of fruit essential oil of *Cuminum cyminum* against seizures induced by maximal electroshock (MES) or pentylenetetrazole (PTZ) in mice. The result showed administration of essential oil protects mice against MES- and PTZ-induced tonic seizures [44].

Anti-osteoporotic Activity: Malini et al., evaluated the anti-osteoporotic effect of phytoestrogens present in cumin. The finding revealed a significant reduction in urinary calcium excretion, augmentation of calcium content and mechanical strength of bones [45].

Immunomodulatory Activity: Chauhan et al., reported immunomodulatory activity of many herbs including *Cuminum cyminum* using flow cytometry and ELISHA in normal and immune-suppressed animals. Oral administration of cumin stimulated the T cells (CD4 and CD8), elevated corticosterone levels and increase the size of adrenal glands and the weight of thymus in mice [46]. The finding concluded that *C. cyminum* is a potent immunomodulatory.

Antioxidant Activity: Bettaieb et al., reported antioxidant activity of essential oils of cumin by several test methods such as quench hydroxyl radicals, 1, 1-diphenyl-2-picrylhydrazyl (DPPH) radicals and lipid peroxides [47]. Topal et al., evaluated antioxidant activities of essential oils

from nine different species of Turkish plants, named *Melissa officinalis* L., *Rosmarinus officinalis* L., *Cuminum cyminum* L., *Piper nigrum* L., *Lavandula stoechas* spp., *Foeniculum vulgare*, *Pimpinella anisum* L., *Thymus serpyllum* and *Liquidamber orientalis* Mill via DPPH assay. In the DPPH assay, *R. officinalis*, *C. cyminum*, *P. anisum*, *T. serpyllum* and *L. orientalis* essential oils showed higher antioxidant activity [48].

Effect of Platelet Function: Srivastava et al., evaluated that ethereal extract of both cumin and turmeric inhibited arachidonate-induced platelet aggregation. It also inhibited thromboxane B2 production from exogenous arachidonic acid (AA) in washed platelets, in addition, a simultaneous increase in the formation of lipoxygenase—derived products was also observed [49].

Effect on erythrocyte hemolysis: Atrooz et al., evaluated the effect of methanolic and acetic seed extract of cumin on human erythrocyte hemolysis in comparison to caraway. The finding revealed that both extracts protected erythrocytes from hemolysis. The methanolic extract showed a higher percentage of protection than caraway [50].

Toxicity: Allahghadri et al., reported acute and subchronic toxicity of cumin essential oil in 30-day oral toxicity in rats. 17.38% decrease in WBCs count, and 25.77%, 14.24% and 108.81% increase in hemoglobin concentration, hematocrit, and platelet count respectively were noted. LDL/HDL ratio was reduced to half [51].

Conclusion: *Cuminum cyminum* is an extensively utilized medical herb for various therapeutic potential. This spice is present in almost each medication system worldwide. Several reports have mentioned numerous properties of *Cuminum cyminum* like anti-diabetic, antimicrobial, antioxidant, cardioprotective and anticancer. Each of these properties plays a key role in the advancement of human health. Aldehyde (60%) fats, amino acids, flavonoids and glycosides (22%) are present as constituents of this plant. Cuminaldehyde is a chief component of this plant. *Cuminum cyminum* has been extensively explored for its pharmacological actions. Each aspect of the plant from morphology description to phytochemical profile and therapeutic action has been thoroughly explored in the present study.

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