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Zeera Safaid (Seeds of *Cuminum cyminum* Linn.): A Comprehensive Review

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ABSTRACT

Cumin is a small herbaceous annual plant that belongs to the *Apiaceae* family. It's a plant that may be used for a variety of things. India is the world's largest producer, exporter, and consumer of cumin seeds Chemical constituents of *Cuminum cyminum* flavonoid, protein, resin, saponin, glycoside, coumarin, tannin and steroid, anthraquinone alkaloid. Recent studies have proved that it possesses antimicrobial, anti-inflammatory and analgesic effects. In traditional medicine, cumin is used to treat a wide range of ailments, including hypolipidemia, cancer, and diabetes. As per Unani medicine, it possesses several important actions like *Qābiḍ* (Astringent), *Muḥallil* (Resolvent), *Mujaffif* (Desiccant), *Mufattiḥ* (Deobstruent), *Kāsir-i-Riyāḥ* (Carminative), *Hāḍim* (Digestive), *Munaffith-i-Balgham* (Expectorant) and use to treat *Sabal* (Keratitis/Pannus), *Jarab al-'Ayn* (Trachoma), *QūlanjMi'dī* (Gastric Colic), *Mushtahī* (Appetizer), *Ẓafara* (Pterygium), *Muwallid-i-Laban* (Galactopoietic), *Mudirr-i-Bawl* (Diuretic).

INTRODUCTION

According to the World Health Organization (WHO), herbal medicine is used by 80% of the world's population for some aspect of primary health care. [1] *Cumin* have several pharmacological effects, including antioxidant, anticancer, antifungal, antibacterial, anti-inflammatory, analgesic, immunological, and anti-erythrocyte hemolysis capabilities. [2-70] *Cuminum cyminum* contains flavonoid, protein, resin, saponin, glycoside, coumarin, tannin, and steroid, anthraquinone alkaloid chemical components.[85]

PLANT PROFILE

Synonyms: *Cuminia cyminum* J. F. Gmel., *Cyminonlongeinvolucellatum* St.-Lag, *Cuminum aegyptiacum Mérat* ex DC., *Cuminum odorum Salisb*, *Cuminum sativum* J. Sm.[71]

Taxonomical classification: [72]

Kingdom: *Plantae*

Subkingdom: *Viridiplantae*– green plants

Infrakingdom: *Streptophyta*– land plants

Super division: *Embryophyte*

Division: *Tracheophyta*– vascular plants, tracheophytes

Subdivision: *Spermatophytina*–spermatophytes, seed plants, phanérogames

Class: *Magnoliopsida*

Superorder: *Asteranae*

Order: *Apiales*

Family: *Apiaceae*

Genus: *Cuminum* L. – cumin

Species: *Cuminum cyminum* L. – cumin

Vernaculars name:[73]

Sanskrit: *Jeeraka,*

Hindi: *Jeera,*

Tamil: *Zirgaum,*

Oriya: *Jeera,*

Marathi: *Jire,*

Arabic: *Kamoun, Kammun,*

Telugu: *Jikaka,*

Russian: *Kemin, Kminrimskii,*

Spanish: *Comino,*

Greek: *Kimino,*

Italian: *Comino,*

Japanese: *Himeunikyoo,*

Iran: *Zira.*

Habitat and Distribution

Cumin is an Egyptian native that has been grown in the Middle East, India, China, and Mediterranean countries for thousands of years. It's a delicate plant. The height varies between 10 and 50 cm. The leaves are pinnatifid and finely pinnatifid. The blooms are grouped in umbels with 3 to 5 blossoms per umbel. A schizocarp with awl-shaped calyx points crowns the fruit.[74]

Figure 1: Zeera Safaid: Seeds of Cuminum cyminum Linn

Traditional uses:

Cumin has been used in traditional medicine to cure a variety of ailments, including dyspepsia, corneal opacities, ulcers, boils, styes, and cough reduction. Cuminum cyminum fruits were employed as a carminative, diuretic, astringent, anti-inflammatory, emmenagogue, and abortifacient in the Unani system of medicine. [75-77]

Parts used: The medicinal parts were the dried fruit, Cumin oil extracted from the ripe fruit. [74]

***Mizāj* (Temperament):** $Hot_2\ Dry_3$,[78] $Hot_2\ Dry_2$,[79]$Hot_4\ Dry_3$ [80]

***Badal* (Substitute):** *Nankhwa* (Omum seeds), *Zeera syrah* (Black cumin)[79,81]

***Musleh* (Correctives)**: *Sirka* (Vinegar)[79]

Safety Aspect: In previously exposed people, the seeds demonstrated allergenic activity. [80]

Afaal* (Pharmacological Action):Jālī* (Detergent), *Mulaṭṭif* (Demulcent), *Qābiḍ* (Astringent), *Muḥallil* (Resolvent),*Mujaffif* (Desiccant), *Mufattiḥ* (Deobstruent), *Kāsir-i-Riyāḥ* (Carminative), *Hāḍim* (Digestive), *Munaffith-i-Balgham* (Expectorant).[82]

***MawaqeIstemaal* (Therapeutic uses):** *Zeera safaid* used in *Sabal* (Keratitis/Pannus), *Jarabal-ʻAyn* (Trachoma), *Qūlanj-e-Miʻdī* (Gastric Colic), *Mushtahī* (Appetizer), *Ẓafara* (Pterygium), *Muwallid-i-Laban* (Galactopoietic), *Mudirr-i-Bawl* (Diuretic).[82]

***MashhurMurakkabat*(Famous Important formulations)**:

Jawārish mastagi murakkab,

Safūf -i-Hāḍim, Safūfmudirrr-i-Ḥayḍ.[82]

Dose:

3 grams to 5 grams [81]

Physicochemical characteristics:

Moisture content: 8%, PH: 7.3, total ash: 7.5, acid insoluble ash: 18%, alcohol soluble extractive: 6.58%, water soluble extractive: 138% and ether soluble extractive: 11.44 ± 0.20 and 12.36 ± 0.23% in the wet and dry fruits respectively. Crude protein 18.40 ± 0.16 and 19.88 ± 0.20%, crude fibers 21.82 ± 0.13 and 23.57 ± 0.13%, total carbohydrate 55.58 and 60.05% in the wet and dry fruits respectively. [83]

Physical properties of the essential oil of cumin seeds:

Extraction percentage: 2.3-5.7 %, colour: colourless or pale yellow, density (20 ºC): 0.90-0.94, refractive index (20ºC): 1.47-1.50, aldehyde percentage (on the basis of cuminaldehyde): 35-63%, alcohol solubility (80% v/v): 1:1.3-1:2, alcohol percentage (on the basis of cuminol): 3.5, acidity (on the basis of cuminic acid): 0.36-1.8, carbonyl index: 9.32 and steric index: 19.24. [84]

Chemical constituents:

Cuminum cyminum contained the following chemical constituents: coumarin, glycoside, flavonoid, protein, resin, saponin, tannin and steroid, anthraquinone, an alkaloid. [85]

Nutrient contents of cumin (in 2 g of seeds) were included:

The major compounds in cumin essential oil of Egyptian cultivars were cumin aldehyde (35.25%), tetradecene (12.25%), γ-terpenene (12%), β-ocimene (9.72%), p-mentha-2-en-ol (9%), α-terpinyl acetate (5.32%), αterpinolene (3%), lmonine (0.5%), myrcene (0.2%), β-pinene (0.9%) and α-pinene (0.19%) (82) . Tunisian variety of Cuminum cyminum contained cuminlaldehyde (39.48%), gamma-terpinene (15.21%), Ocymene (11.82%), beta-pinene (11.13%), 2-caren-10-al (7.93%), trans-carveol (4.49%) and myrtenal (3.5%) as major

components. [84] Analysis of the fruit oil of Cuminum cyminum from Delhi showed that the major constituents were transdihydrocarvone (31.11%), γ-terpinene (23.22%), p-cymene (15.8%), α- phellandrene (12.01%) and pmenth-2-en-7-ol (3.48%) and cuminlaldehyde constituted only 0.58%. [86]

PHARMACOLOGICAL ACTIONS

Antimicrobial effect

By using the microdilution method, ethanol extracts of *Cuminum cyminum* seed were tested *in vitro* for antimicrobial activity. Biofilms were resistant to an ethanol extract of the seed. *E. coli.* [87] Using agar diffusion and serial dilution techniques, all essential oils, and cuminic aldehyde were evaluated against Gram-positive and Gram-negative bacteria obtained from various dietary sources. (Pork fillet, minced meat, and sausages) and clinical isolates, as well as three different *Candida albicans* isolates. All cumin oils and cuminic aldehyde exhibited a considerable inhibitory effect against all the tested organisms, except *Pseudomonas* spp.[88] The inhibitory effect of steam distilled essential oil of cumin fruits were tested against three Gram-negative bacteria (*Escherichia coli*, *Pseudomonas fluorescens*, *Serratia marcescens*), four Gram-positive bacteria (*Micrococcus* spp., *Staphylococcus aureus*, *Sarcina* spp., and *Bacillus subtilis*), an acid-fast bacterium (*Mycobacteriumphlei*), and one yeast (*Saccharomyces cerevisiae*). Cumin oil was shown to have high antibacterial action, according to the findings. [89]

Effect on Platelets

Arachidonate-induced platelet aggregation was inhibited by cumin extract. It also reduced the production of thromboxane B2 from exogenous (14C) arachidonic acid (AA) in washed platelets, while simultaneously increasing the formation of lipoxygenase-derived products. [90]

Contraceptive effect

In male albino rats, the contraceptive efficacy of *Cuminum cyminum* isolated fractions (CcFr) was investigated. An oral dose of CcFr 50 mg/rat/day for 60 days revealed no significant changes in body weight, while marked abnormalities in spermatogenesis were observed with decreased counts ($P \leq 0.001$) in round spermatids, preleptotene spermatocytes, and secondary

spermatocytes. The cross-sectional surface area of Sertoli cells, as well as several mature Leydig cells, were decreased significantly ($p \leq 0.001$). Testicular, as well as accessory sex organ biochemical parameters, were significantly changed ($p \leq 0.001$). Sperm motility, density, and morphology resulted in 100% negative fertility. Testosterone levels were declined significantly. Cuminum cyminum inhibited spermatogenesis in rats, according to the authors, and could be used as a herbal male contraceptive.[91]

Antidiabetic effect

Cuminaldehyde and cuminol were identified as potent insulinotropic components. Cuminaldehyde and cuminol (25 µg/ml) showed 3.34- and 3.85-fold increased insulin secretion, respectively. The insulinotropic action of both components was glucose-dependent and due to the closure of the ATP-sensitive K (K^+ -ATP) channel and the increase in intracellular Ca^{2+} concentration. An inhibitor of insulin secretion with potent β cell-protective action was also isolated from the same petroleum ether fraction. The authors concluded that *Cuminum cyminum* was able to lower blood glucose without causing hypoglycemia or β-cell burnout. [92]

Effect on the gastrointestinal system

The antiulcer activity of aqueous extracts of dried leaves of cumin against diclofenac sodium-induced stomach ulceration in rats was compared to omeprazole. To varying degrees, cumin extracts enhanced recovery. The combined therapeutic activity of piper betel and cumin aqueous extracts was shown to be superior to the combined healing activity of cumin and piper betel aqueous extracts. The aqueous extract also improves mucin protection and regeneration in the stomach.[93]

Anti-inflammatory and analgesic effects

The analgesic and anti-inflammatory effects of *Cuminum cyminum* extracts (200 and 500 mg/kg for aqueous and ethanolic extract) were evaluated using the acetic-acid induced writhing, hot plate, Carrageenan-induced paw edema, and Cotton-pellet granuloma methods. When compared to the control group, both the aqueous and ethanolic extracts demonstrated significant anti-inflammatory activity in the Carrageenan-induced paw edema and Cotton-pellet granuloma models. Both the aqueous and ethanolic extracts showed highly significant

analgesic activity in Acetic-acid induced writhing, while the ethanolic extracts were effective in the hot plate method.[94]

Immunological effect:

Cuminum cyminum's health-promoting and immunomodulatory properties were studied in normal and immune-compromised animals using flow cytometry and ELISA. *Cuminum cyminum* stimulated the expression of T cells and Th1 cytokines in normal animals. Swiss albino mice were given *Cuminum cyminum* (25, 50, 100, and 200 mg/kg) orally on consecutive days after being subjected to Cyclosporine-A-induced immune suppression. The results showed that administration significantly increased the number of T cells (CD_4 and CD_8) and the Th1 dominant immune response in a dose-dependent manner, suggesting immunomodulatory activity via T lymphocyte expression modulation. In restraint stress-induced immune-suppressed animals, Cuminum cyminum countered the depleted T lymphocytes, decreased the elevated corticosterone levels and size of adrenal glands, and increased the weight of thymus and spleen.[95]

CONCLUSION

Cumin is primarily grown for its medicinal, nutraceutical, and pharmacological qualities. It's also used in a variety of drinks, foods, liquors and perfumes. Cumin's antioxidant, antibacterial, antifungal, anti-inflammatory, antidiabetic, insecticide, and immunomodulatory characteristics are largely responsible for its medicinal and health benefits. Cumin plant parts (leaves, shoots, roots, and flowers) all contain chemical substances that are similar and different. However, more research is needed to uncover new cumin components and uses.

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