NOTES ON NATURAL HISTORY

Cumin (*Cuminum cyminum* L.): Therapeutic Potentiality

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Key words: Neuroprotective properties,

Introduction:

Cumin (*Cuminum cyminum* L.) is one of the major spice crops growing extensively under irrigated and rainfed conditions in Rajasthan, India (Sharma & Trivedi, 2003) and its native place is the East Mediterranean to South Asia. Cumin seeds (Jeera), used in different forms in food items and as traditional medicine since ancient times. According to the Ayurvedic Jeera is having high medicinal value, particularly against digestive disorders. It possesses antioxidant activity as its essential oil contains cuminaldehyde, cuminal, β -pinene, γ -terpinene, and safranal (Surveswaran *et al.*, 2007). Pinocarveol is a major constituent in its volatile oil that possesses antioxidant capacity (El-Ghorab *et al.*, 2010). Bettaieb *et al.* (2010) found that γ -terpinene from roots, α -terpinene from stems, and bornyl acetate from flowers are antioxidant components and phenolic compound, quercetin identified in the roots whereas stems and leaves contain mainly *p*-coumaric, rosmarinic, trans-2- dihydrocinnamic acids and resorcinol. Various constituents of *C.cuminum* L. such as alkaloid, coumarin, anthraquinone, glycoside, resin, tannin and saponin and steroids have pharmacological activities (Al-Snafi, 2016). Jeera contains dietary minerals predominantly iron, proteins, fats dietary fibers and vitamin B & E. Cuminaldehyde, cymene and terpenoids are the important volatile components of the cumin essential oil Bettaieb *et al.* (2011). Cuminaldehyde and cuminic alcohol are the major constituents responsible for its aroma and flavor. Cumin seeds also contain other components such as γ -terpinene, safranal, *p*-cymene, and β -terpinene (Li & Jiang *et al.*, 2004). The bioactive constituents such as terpenes, phenols, and flavonoids confer medicinal properties to Jeera (Mnif & Aifa, 2015).

Therapeutic potential of *Cuminum cyminum*:

Digestive stimulant action: Jeera is used to aid digestion in traditional medicine and in-home remedies. It was investigated that Jeera lower the pancreatic lipase activity whereas activities of pancreatic trypsin, chymotrypsin and amylase are increased in the pancreas and intestinal mucosa of rat (Platel & Srinivasan, 2000a). Platel & Srinivasan (2000b) also reported the stimulatory effect of

Jeera on the bile flow rate. It was estimated that Jeera have a stimulatory role of bile acid secretion in the digestive system and the duration of residence of food in the gastrointestinal tract is also affected by 25% in the experimental rats (Platel & Srinivasan, 2001). Jeera cause a reduction in food transition time by their beneficial effect on bile secretion and digestive enzymes.

Anti-microbial effect: the essential oil and alcoholic extract from *C.cuminum* possesses antimicrobial properties. The active component of essential oil, cuminaldehyde is used to inhibit capsule expression and urease activity inhibition from *Klebsiella pneumonia* (Derakhshan & Sattari, 2008).

Anti-inflammatory and antioxidant properties: the essential oil from *C.cuminum* contains volatile components that are identified as an anti-inflammatory role on the lipopolysaccharide-stimulated cells by inhibiting mitogen-activated protein kinase (Wei *et al.*, 2015). The methanol extract of cumin showed better antioxidant properties than *n*-hexane extract as it inhibits free radical formation and hydroxylation (Thippeswamy & Naidu, 2005).

Anti-diabetic properties: Jeera has also proven anti-diabetic effects. It was observed that oral administration of an Ayurvedic formulation containing *C.cuminum* to non-insulin dependent diabetes mellitus patients (Karnick, 1991) and it results in the reduction of pre and post-prandial blood sugar level in all patients. Hyperglycemia and glucosuria are found to be reduced by an 8-week dietary regimen with cumin seeds in powdered form. In alloxan diabetic rats, hyperlipidemia associated with the diabetes mellitus was also examined by dietary Jeera (Dandapani *et al.*, 2002). Alcoholic extracts of *C.cuminum* is compared to chemical antidiabetic component *i.e.*, glibenclamide and was found more effective when tested in streptozotocin-diabetic rats as it inhibits radicals and AGE (advanced glycated end products) formation thus control diabetes (Jagtap & Patil, 2010).

Anti-allergic effect: water-soluble components of Jeera have an anti-allergic effect. The doses of aqueous extract of Jeera can significantly suppress the degranulation of rat basophilic leukemia cell line RBL-2H3 cells induced by

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antigen without cytotoxicity. Immunoblot analysis suggested that suppression was done by the phosphorylation of phosphatidylinositol 3-kinase, phospholipase C- γ 1/2, Bruton's tyrosine kinase and AKT in the signaling pathway (Makoto & Kosuke, 2019).

Hypolipidemic and anti hypotensive effects: the antihypertensive effect and reduction in inflammation, as well as oxidative stress, was observed in renal hypertensive rat for 9-weeks by oral administration of aqueous extract of Jeera (Kalaivani *et al.*, 2013). Jeera shows antioxidant activity due to the presence of flavonoids, thus helps in maintaining an antioxidant system. The level of oxidized low-density lipoprotein was found to be lowered by cumin extract and also contributed to raising the activities of paraoxonase and arylesterase in serum (Samani & Farrokhi, 2014).

Chemopreventive effects: evaluation of anti-cancerous potential of cumin seeds was done against tumorigenesis in the stomach of rats that is induced by benzo(α)pyrene and also in the uterine cervix which is induced by 3-methylcholanthrene (Gagandeep *et al.*, 2003). It is reported that it inhibits stomach tumor and lipid peroxidation which is attributed to its ability to modulate carcinogen metabolism. Also, a study of its effect on colon cancer that is induced by 1,2-dimethylhydrazine (DMH) tells that the colon carcinogenesis can be inhibited by cumin extract, in the presence of the procarcinogen DMH. (Nalini *et al.*, 2006). It was suggested that prevention or management of degenerative diseases could be done by nutraceutical food formation made out of spent cumin generated from an Ayurvedic industry (Arun *et al.*, 2016).

Miscellaneous nutraceutical effects: an effect of aqueous extracts of Jeera on diarrhea that is induced by castor oil in albino rats were examined and results showed significant inhibition by delaying the defecation time (Sahoo *et al.*, 2014). It was suggested that natural abundant compound cumin aldehyde from *C. cyminum* essential oil could have potential therapeutic applications as they can modify α -SN Fibrillation as it is a cause of many neurodegenerative diseases (Morshedi *et al.*, 2015).

Conclusively, many therapeutic potentials of aqueous extract and essential oil of *Cuminum cyminum* L. for digestive stimulating, anti-inflammatory, antioxidant, antidiabetic chemo-preventive, dyspepsia, neuro-protective and cardio-protective activities etc. have been identified. Thus it could be developed as a drug or as an adjuvant of a drug to cure many diseases.

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