



A review on potential antioxidant effects of Cumin (*Cuminum cyminum*), phytochemical Profile and its uses

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Abstract: Spices are the structure squares of flavor in food. Their essential capacities are to give fragrance, surface what's more, shading to food. Moreover they likewise go about as additive, and give dietary, and medical advantages. Cumin (*Cuminum cyminum*) privately known as 'zeera' is a blooming plant in the family Apiaceae. It is generally utilized as a topping and seasoning in numerous eastern dishes. Cumin is known for its cell reinforcement properties. Despite the fact that the seeds of cumin (*Cuminum cyminum* L.) are generally utilized as a flavor for their unmistakable smell, they are likewise regularly utilized in customary medication to treat an assortment of ailments. The writing presents plentiful proof for the biomedical exercises of cumin, which have for the most part been attributed to its bioactive constituents, for example, terpenes, phenols, and flavonoids. Various pre-clinical and clinical preliminaries have explored its adequacy utilizing the seed oil, basic oil, and its fundamental constituent thymoquinone (TQ). Different investigations made in the most recent decades approve its wellbeing useful impacts especially in diabetes, dyslipidemia, hypertension, respiratory issues, fiery illnesses, and disease. These examinations uphold its utilization either autonomously or as an assistant alongside ordinary medications in respiratory issues, unfavorably susceptible rhinitis, dyspepsia, metabolic disorder, diabetes mellitus, provocative infections, and various kinds of human disease.

Key words: cumin; biological activity; antifungal; antimicrobial effect; antioxidant

Introduction: *Cuminum cyminum* (cumin) is an important and popular spice commonly known as ‘zeera’ that is used for culinary purposes due to its special aromatic effect (Fatima et al., 2018). It belongs to the family known as *Apiaceae*. It is the most primitive cultivated herbs in Europe, Asia, and Africa (Bansal et al., 2014). It is an annual, diploid cross-pollinated herb, medicinal spice, and aromatic plant, which is most widely used as a flavoring agent and food additive in different cookerries(Pandey et al., 2015). After black pepper, the second most common spice in the world is *C. cyminum* (Gohari and Saeidnia, 2011).

C. cyminum is cultivated in countries like Arabia, China, and India(Hajlaoui et al., 2010). It is a multipurpose plant that is used worldwide for various culinary and medicinal purposes. It is



Fig: 1 **Cumin** (*Cuminum cyminum*)

usually used for imparting taste to diverse food provisions including cheese, soup, cheese, bean dishes pickle, and liquors (Mnif and Aifa, 2015). The minerals like copper, potassium, iron, manganese, magnesium, calcium, zinc, and selenium are most abundant in this spice. It additionally contains awesome measures of vitamins such as vitamin B-6, niacin, thiamin, and riboflavin. Some other indispensable anti-oxidant vitamins like vitamin C, vitamin E, and vitamin A are also present in it(Verma, 2016).*C. cyminum* is a significant part of chili powder

and curry that is utilized to enhance the flavor in economic food items. It is additionally squashed and blended in with foods, for example, meat, fish, cakes, and the seeds sprinkled on bread (Gangadharappa et al., 2017).

C. cyminum is called Jeeraka in Sanskrit and Jeera in Hindi (Jani and Gujarathi, 2016). There are different vernacular names of this plant in different languages e.g. Zeera (Punjabi), Cumin (English), Jire (Marathi), Amla (Urdu), Jira or Zeera (Hindi), Jikaka (Telugu), Jeera (Gujarati), Zirgaum (Tamil), Jeera (Oriya), (Rai et al., 2012). While known as Machin (Chinese), Kimino (Greek), Comino (Italian), Kamoun, Kammun (Arabic), Caminho (Portuguese), Caraway (Roman), Romischer Kummel (German), Cumin de Malte (French), Spiskummin (Swedish), Kemin, Kminrimskii (Russian), Comino (Spanish), Himeunikyoo (Japanese) (Al-Snafi, 2016), Zira (Iran), jintan (Indonesians), zeera (Pakistan) (Ravi et al., 2013), (Bansal et al., 2014), (Nadeem and Riaz, 2012). *C. cyminum* whose common name is cumin was derived from *Cuminum* which is a Latin word which itself originated from a Greek word kyminon (Al-Snafi, 2016).

C. cyminum is an annual plant. The assessed world production is about 300,000 tons. Nowadays production is for the most part gathered in Central and South Asia. India is the biggest producer (70% of world production), consumer, and exporter of its seed in the world (Agarwal et al., 2017). During Rabi season, it is typically developed in Rajasthan and Gujarat states in India. other cumin growing countries in the world are Iran, Greece, Syria, Egypt Turkey, and Morocco. There is about 90% total production of *C. cyminum* seed in India, out of which Rajasthan state alone contributes about 52% of complete national production (R.S. Meena and R. K. Kakani, 2015). The main growing areas of *C. cyminum* are Gujarat and Rajasthan (Pathak et al., 2011). *C. cyminum* is dry spell tolerant and is for the most part developed in Mediterranean climates. It is cultivated with moderate winter and light rain in semi-arid areas. This plant is developed from seed which is planted in spring and requires well-drained and productive soil. When the atmosphere is humid, better crops can be developed. Seeds are planted throughout April-May and planting is completed between central November and December. Cultivation of *C. cyminum* needs a blistering summer of three to four months, with day-time temperature about 30°C. There 100 to 110 days is the total vegetative period of *C. cyminum* (Rai et al., 2012).

In traditional medicine, *C. cyminum* is utilized to treat jaundice, dyspepsia, looseness of the bowels, and roughness. The seeds of this spice are utilized for carminative, diuretic, and stomachic properties. The seeds are likewise utilized broadly to quit morning sickness, jaundice, vomiting, colic, and so forth (Rai et al., 2012).

C. cyminum is a boat-shaped seed plant small which is brownish. It has a spicy-sweet aroma, bitter, and pungent flavor(Gangadharappa et al., 2017). It raises to a height of 15-50 cm. It is a yearly plant, with a 20-30 cm tall stem. The leaves are bipinnate, thread-like leaflets, and 5-10 cm long (Bansal et al., 2014). These are highly dichotomized and blue-green. It has a long, white root(Gohari and Saeidnia, 2011). The flowers are small, pink, or white, overtopped by the bracts. The arrangement of flowers looks like an umbrella that consists of about 5 rays, with the involucre containing 2 or 3 filiform, 1sided bracts(Gangadharappa et al., 2017).

The fruit color is brown with light-colored edges. These are about 4-6 mm long, 2 mm wide, ellipsoidal, thicker in the middle, compressed laterally about 5 inches long, elongated, and containing a single seed (Gohari and Saeidnia, 2011), (Sharan, 2016). The fruits are fennel like seeds. When seeds are chewed has a bitter and pungent taste (Gangadharappa et al., 2017). In the Unani group of medicine, the *C. cyminum* fruits are used for the treatment of ulcers, boils, styles of corneal opacities and to diminish inflammation and cough (Agarwal et al., 2017).

The fruit of *C. cyminum* consists of 10% fixed oil, proteins, and 2.5 to 4.5% volatile oil. The cuminaldehyde mainly consists of 30 to 50% of volatile oil whereas minor amounts of phellandrene, hydro cuminaldehyde, α -pinene, hydrated cuminaldehyde, cuminal alcohol, and β -pinene. This fruit has a pungent and sharp burning taste. It heals ulcers, stytes, and corneal opacities. It stops epistaxis, cures asthma, scabies, gonorrhea, hemoptysis, abortifacient, carminative, emmenagogue, enlargement of the spleen; applied to boils, and ulcers, tonic to the intestine, relieves cough, inflammations (S. I. Shivakumar, A. A. Shahapurkar, 2011).

C. cyminum seeds look like caraway seeds, yellow or brown, longitudinally ridged, and oblong (Bansal et al., 2014). These are thicker in the center, flattened laterally about 5 inches long(Gohari and Saeidnia, 2011).For thousands of years, the seeds of *C. Cyminum* is used in India as per a traditional ingredient of several dishes including soups, kormas, and also a constituent of several other spice combinations (Srinivasan, 2018).



C. cyminum flower



C. cyminum seed

The seeds have been extensively utilized in traditional medication and also for the treatment of numerous diseases and health disorders, such as jaundice, diarrhea, toothaches, dyspepsia, and epilepsy. These medicinal assistances have usually been familiar to its rich content and potent action of active constituents such as flavonoids, terpenes, and phenols (Aifa, 2015). These are used as a spice for their characteristic aroma and flavor. It increases appetite, vision strength, digestion, lactation, and taste perception. Some puerperal disorders like diarrhea, edema, loss of appetite, fever, vomiting, and abdominal distension are also treated by this spice (Pandey et al., 2015). These are carminative, stimulant, astringent, aromatic stomachic, and synergistic in effect (Shah et al., 2018). In Algeria, it is used principally in veterinary medicine but still, it is also a traditional herbal remedy. In pregnancy, it is suspicious to reduce nausea and boost lactation. It cures the swelling of the testicles or breasts (Saini et al., 2014).

The essential oil is the most important chemical component of its fruit which ranging from 2.5% to 4.5%. It is important for the distinctive *C. Cyminum* aroma (S. Hanafi et al., 2014). The flavor and aroma are principally due to the presence of aldehydes (Nadeem and Riaz, 2012). Depending upon the age and regional variations it is pale to colorless. The major component of cumin fruit oil is Cumin aldehyde (S. Hanafi et al., 2014).

In animals, methanol extract of *C. cyminum* raises the mechanical strength of bones and calcium content. It also presented a significant decrease in urinary calcium elimination (Parashar et al., 2014). The oil of *C. cyminum*is was retrieved through steam distillation. It is utilized in spirits and perfumery (Baser et al., 1992). The volatile oils of its dried fruit produce 2.4 % for ripe, 2.3 % for fully rip, and 1.9 % for unripe fruit. Cumin aldehyde, p-cymene, p-mentha-1,4-dien-7-al-terpinene, and p- mentha-1,3-dien-7-al were the

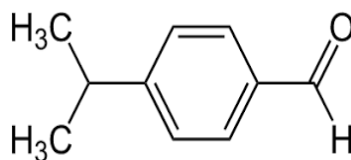
major components(Kan et al., 2007). However, a large amount of post-distillation waste material that remains unused contains polyphenolics and possesses a poor antioxidative capacity (Acimovic et al., 2016).



C. cyminum seed oil

When *C. cyminum* oil is fresh, it looks colorless or yellow but after sometime turning dark and deterioration in odor. Its quality is continuously related to a reduction in cuminaldehyde content and a perceptible increase in the quantities of cuminyl alcohol, p-cymene, β -pinene, linalyl acetate, and γ -terpinene. (Baser et al., 1992). In the Mediterranean and Asian cultures, *C. cyminum* seed and essential oil have been used in various home-based remedies (Zheljaskov et al., 2015).

The principal constituent of *C. cyminum* oil is Cuminaldehyde which is used in perfumery. It adds taste in food and also acts as one of the herbal remedies against many health disorders. It acts as a tonic benefiting the nervous system, circulatory system, respiratory system, and excretory system(Rai et al., 2012).



Cuminaldehyde

C. cyminum assists in digesting food appropriately. It is considered as one of the best herbs for digestion. It also helps in the treatment of problems

related to digestion due to cumin aldehyde, which is stimulated by our salivary glands and this enables the principal digestion of food(Rai et al., 2012).

C. cyminum is recognized for its astringent, stimulant, carminative, diuretic, antispasmodic properties (Dua et al., 2013). Its oil showed maximum antioxidant activity that has been known due to the occurrence of linalool, carvacrol, flavonoids, monoterpene alcohols, and other polyphenolic compounds(Bansal et al., 2014).

Taxonomical Classification (Agarwal et al., 2017), (Prajapati et al., 2019).

Biological name	<i>Cuminum cyminum</i>
Kingdom	Plantae
Phylum	Tracheophyta
Class	Magnoliopsida
Order	Apiales
Family	Apiaceae
Genus	<i>Cuminum</i>
Specie	<i>Cuminum cyminum</i>

Nutritive and Phytochemical Profile

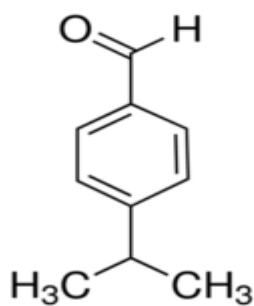
The study of plants derived chemicals is called phytochemistry. This term described the great number of primary and secondary metabolic compounds present in plants. Based on the chemical structure and characteristics, there are six major categories of phytochemicals. These categories comprise various nitrogen-containing compounds, carbohydrates, alkaloids, phenolics, lipids, and terpenoids. These are compounds that occur in plants naturally, biologically active, which provide health benefits to humans than macronutrients and micronutrients(Prajapati et al., 2019). Phytochemicals are responsible for the bio-activity in natural products for the plant resistance against pathogen attack, abiotic stresses, herbivory, and inter-plant competition. These phytochemicals involuntarily protect humans in contrast to pathogens employing anti-microbial medicines. Some phytochemicals act as antioxidants that inhibit carcinogens and provide nutrition for normal health and repairs of the cell. These are

also recognized to have therapeutic and prophylactic properties. The medicinal effects of phytochemicals are exerted in assistant synergistically. This destroys the side effects related to the predominance of a solitary xenobiotic compound. It delivers the herbal medicine and a wide range of activity as well as reducing the chances of the pathogen's emergent resistance (Njerua et al., 2013).

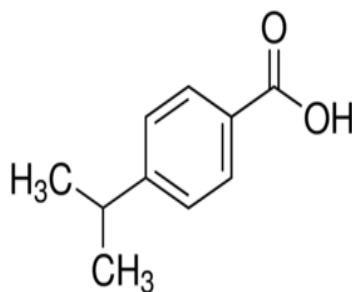
Phytochemicals are present in spices, nuts, fungi, fruits, grains, vegetables, herbs, and legumes. Phytochemicals occur in diverse parts of the plant like stem, leaves, root, flowers, fruits, or seeds (Prajapati et al., 2019). *C. cyminum* seeds consist of many phytochemicals that are recognized to have carminative, anti-flatulent, and antioxidant properties (Parashar et al., 2014). The highest amounts of flavonoid phenolic anti-oxidants such as lutein, carotenes, and zeaxanthin are also found in seeds (Verma, 2016).

Phytochemical analysis exhibited that *C. cyminum* contained: anthraquinone, protein, alkaloid, glycoside, steroid, coumarin, saponin, flavonoid, Resin, and tannin (Rai et al., 2012). The volatile oil components like cuminaldehyde, cinnamic acid, safranal, beta-pinene, caryophyllene, alpha-pinene, p-cymene, thymoquinone, γ -terpene, cuminyl alcohol, limonene, beta-farnesene, linalool, beta-myrcene, alpha-terpineol, beta-phellandrene, benzyl cinnamate, saponins, resin, and also comprises tannins, alkaloids (coniine), flavonoids (quercetin, lutein, carotene), vanillic acid and resorcinol present in diverse portions of the plant (Pathak et al., 2011), (Ladan Moghadam, 2016).

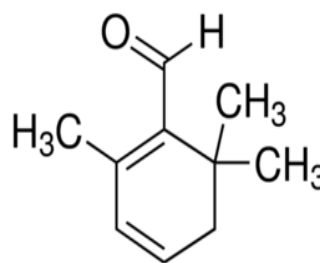
The major compounds occur in *C. cyminum* are cuminaldehyde, α - and β -pinene, cuminic acid, limonene, p-cymene, safranal, linalool, beta-farnesene, α - and γ -terpinene (Bansal et al., 2014).



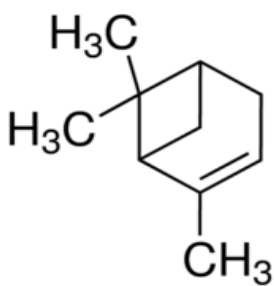
Cuminaldehyde



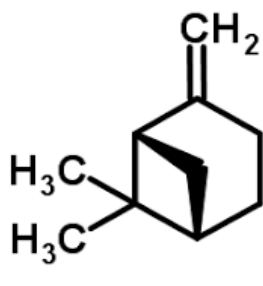
Cuminic acid



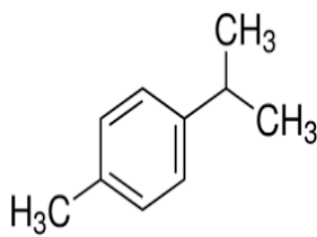
Safranal



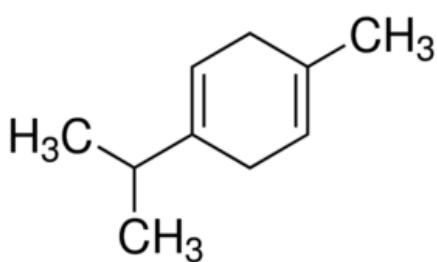
alpha-pinene



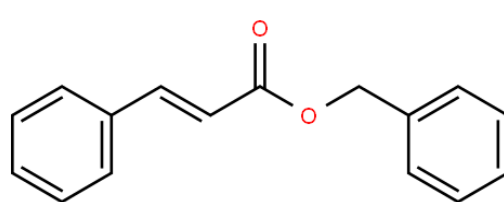
beta-pinene



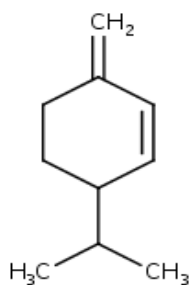
p-cymene



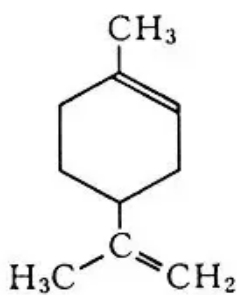
γ-terpinene



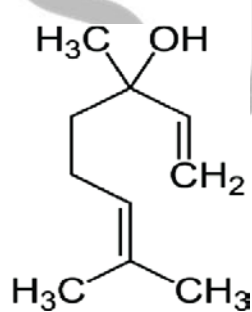
Benzyl cinnamate



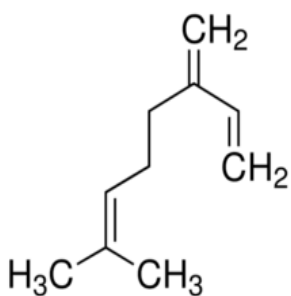
beta-phellandrene



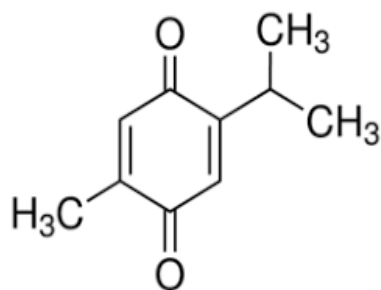
limonene



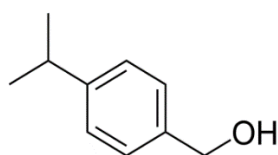
Linalool



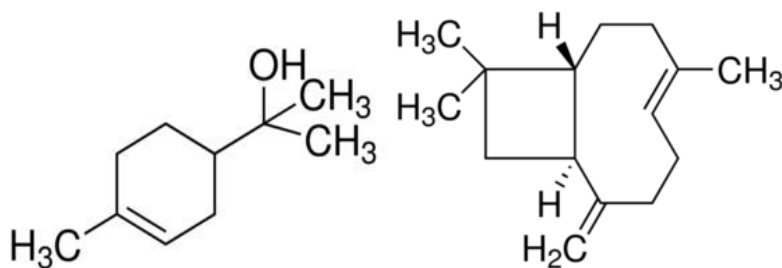
beta-myrcene



Thymoquinone

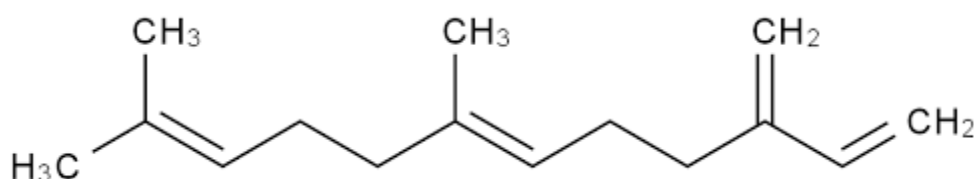


Cuminol



alpha- terpineol

caryophyllene



beta- farnesene

C. cyminum seeds have consisted of several nutrients (protein, amino acids, sugars vitamins, minerals, starch) and other carbohydrates, phytic acid, dietary fiber components, and tannins(Bansal et al., 2014).

Chemical Structure of Essential Oil constituents

Due to the occurrence of cumin aldehyde, *C. cyminum* oil was assumed principally distinct pungent or spicy taste. While the aroma of p-cymene as carrot-like, β -pinene as woody, β -Myrcene as fruity, and γ -terpinene as bitter. Ravi, (2013) investigated and reported the composition of the *C. cyminum* seed oil that it contained mint sulfide as a trace constituent. Higher than 90% of the whole volatile content of cumin essential oil include terpene hydrocarbons like β -pinene, γ -terpinene, p-cymene, and aldehydes like cuminal (Ravi et al., 2013).The principal components identified in this fraction cuminic alcohol (16.92%), safranal (10.87%), and cuminal (36.31%) (Li and Jiang, 2004).

Commonly, eighteen amino acids are recognized in all *C. cyminum* seeds. From which 8 were essential amino acids(Badr and Georgiev, 1990). These comprises numerous nutrients including volatile oil (3-4%), total ash (10%), protein (12%), moisture (7%), fat (15%), fiber (11%), starch (11%) and carbohydrate (33%). According to the region and climate condition, its nutrients composition varies where it is grown (Patil et al., 2017). These seeds are rich in nutrition. They offer higher amounts of protein, fat (especially

monounsaturated fat), Vitamins B, E, dietary fiber, and several dietary minerals, particularly iron(Srinivasan, 2018).

Supplementation of *C. cyminum* could either influence the growth of favorable microorganisms or the feeding pattern in the rumen or stimulate the secretion of several enzymes for digestion, which may recover the productivity of nutrients and stimulate the milk secretory tissues in mammary glands subsequent in better-quality milk production and generative performance of dairy animals. It has several pharmacological effects such as recently, the use of *C. cyminum* has increased popularity because of alternative medicine promoters, the herbal movement initiated by naturopaths, and feed additives. It is trying by animal nutritionists to exploit the potential usage of *C. cyminum* as a growth promoter, mitigation of greenhouse gas emission, and efficiency of nutrient utilization (Patil et al., 2017).

Biological Activities

Anticarcinogenic/antimutagenic or Anticancer Activity

The heavy task in medical science is cancer because it is rapidly increasing across the world (Yimer et al., 2019). It is a major root of expiring and the number of individuals living with cancer as well as the number of new cases is increasing continuously. Potentially, a very diverse derivation of chemical constituents containing tumor cytotoxic activity is kingdom Plantae because a variety of plants are present that synthesize different bioactive compounds (Prakash and Gupta, 2014). In India, Seeds of *C. cyminum* is extensively used in cooking which can demonstrate as anti-carcinogenic agents (Ravi et al., 2013). Thousands of years ago, it is recognized that *C. cyminum* components showed anti-cancer activities but appropriate scientific investigation with this significant traditional medicine is a current story. Further investigation should be highlighted back to this because it is harmless and acts as an anticancer agent(Khan et al., 2011).

C. cyminum seed has been shown chemo-preventive potential. It can be significant due to its capability to change carcinogen metabolism. From the glands, the secretin of anti-carcinogenic enzymes is increased due to the detoxification and chemo-preventive properties of *C. cyminum* seeds. The anti-oxidants present in *C. cyminum* known as limonene that have strong anti-tumor properties. It is revealed by the recent research that the development of cancer cells present in the breast and colon may be prevented by *C. cyminum*(Prakash and Gupta, 2014). *C. cyminum* was shown to decline the activity of enzymes such as β -glucuronidase and mucinous to protect the colon. Mucinase enzyme enhances the hydrolysis

of the protective mucins in the colon whereas the rise in β -glucuronidase activity may boost the hydrolysis of glucuronide conjugates and liberates the toxins(Johri, 2011).

Antimicrobial Activity

Since the next half of the 20th century, the bases of clinical medicine have been known as antimicrobials. A noticeable number of individuals have been saved from severe microbial infections by antimicrobials(Yimer et al., 2019). Medicinal plants are known as a great origin of antimicrobial agents. In various countries, Plants are used as medicine and also a basis of various influential drugs (Ambikapathy et al., 2011). Herbs show antimicrobial characteristics due to the occurrence of various chemical compounds including volatile oils, lipids, alkaloids, and tannins that are presented in their tissue (Pathak et al., 2011).

C. cyminum alcoholic distillate reserved the development of *Klebsiella pneumonia* and its therapeutic isolates by capsule expression, improvement of cell morphology, and decreasing urease activity. The main active compound of *C. cyminum* is cuminaldehyde for this property (Verma, 2016). The strong antibacterial and larvicidal activity are exhibited by this compound. *C. cyminum* seed essential oils show the antimicrobial activity against *Escherichia coli*, *Mycobacterium tuberculosis*, and *Candida albicans*(Pathak et al., 2011). Some other minor constituents have been found in *C. cyminum* oil with limonene, α - pinenes, β - pinenes, and Cuminal suggested as the active antimicrobial agents and show antimicrobial activity(Gohari and Saeidnia, 2011). The anti-bacterial property was assessed contradiction of a variety of pathogenic *gram-negative* and *gram-positive* bacterial strains. Against *Streptococcus pyogenes* and *Streptococcus mutants*, there were found biofilm-formation defensive properties(Bansal et al., 2014).

Antidiabetic activity

A complex disease with numerous symptoms is known as diabetes. Due to the failure of secreting hormone by the pancreas, there is improper consumption of glucose obtained by the digestion of food in the cells. The hormone that regulates the glucose level in the blood is known as insulin. Due to the lack of this hormone, the blood glucose level rises and leads to hyperglycemia. In the condition of hyperglycemia, diabetic patients show many other problems like skin cancer, kidney failure, heart problem, and

highly prone to infections (Kavitha et al., 2018). In the last decade, one non-infectious disease is known as diabetes mellitus which usually ends with expiring.

While the death rate from this disease is comparatively less than the other diseases. But the World Health Organization reported that for 20 years in the last decade, the death rate from diabetes mellitus is high in several developed and developing countries (Rusmarilin et al., 2019). *C. cyminum* powder (1.25%) containing diet was known to be unusually beneficial in streptozotocin-induced diabetic rats as designated by the reduction in glucosuria, improved body weights, hyperglycemia, depressed blood urea, low excretion of urea and creatinine in diabetic animals. *C. cyminum* (0.5% g) per kg body weight orally directed in rats with induced diabetes is described to decrease blood glucose levels. It might be due to suppression of aldose reductase and alpha-glucosidase (Patil et al., 2017). *C. cyminum* seeds methanolic extract reserved glycosylated hemoglobin, lessens the blood glucose, creatinine, blood urea nitrogen, enhanced serum insulin, glycogen (liver and skeletal muscle) content in alloxan and streptozotocin (STZ) diabetic rats (Deepak, 2013). *C. cyminum* seed principle constituent cuminaldehyde has been revealed the inhibitory activity which is evaluated against lens aldose reductase and α -glucosidase isolated from Sprague-Dawley rats also compared with that of quercetin as an aldose reductase inhibitor and acarbose as an α -glucosidase inhibitor (Srinivasan, 2018).

Antioxidant Activity

Those compounds that can postponement or obstruct the oxidation of lipid or supplementary molecules through preventing the initiation or propagation of oxidizing chain reactions are said to be antioxidants. These compounds can increase shelf life and scavenge free radicals utilizing delaying the process of lipid peroxidation. During processing and storage, it is the main reason for the deterioration of food and pharmaceutical products (Elmastas and Aboul-enein, 2012).

Our body is protected by the natural antioxidants in contradiction of harm produced by oxygen reactive species. These are capable to avoid the fat oxidation in foodstuffs and degenerative diseases (Rusmarilin et al., 2019). High antioxidant activity is exhibited by the oil of *C. cyminum* which has been ascribed basically to the occurrence of polyphenolic compounds like flavonoids, linalool, anethole, monoterpene alcohols, and carvacrol (Bansal et al., 2014), (Gohari and Saeidnia, 2011). Antioxidant properties remained evaluated using DPPH free radical scavenging, lipids protection of DNA, and inhibition of metal-induced oxidation of proteins against H₂O₂- induced oxidative stress. It has been reported that

aqueous and methanol extracts of several plant sources have well free radical scavenging activity as compared to the extracts of dichloromethane or ethyl acetate representing the polar nature of the antioxidant biomolecules (A. Dua et al., 2012).

The significant amounts of antioxidant compounds with high antioxidant activity also showed by the oil of *C. cyminum* and good inhibition properties are also shown by its nonvolatile extracts against the free radicals. It is found that there is better antioxidant action in methanol extracts as compared to the n-hexane extracts. Antioxidant activities and the total phenolic content also found a good correlation among their nonvolatile extracts. So, it concludes that there is good antioxidant potential in *C. cyminum*. This spice can be utilized to yield flavoring agents as well as novel natural antioxidants that can be used in several food products (Nadeem and Riaz, 2012). *C. cyminum* yield of 2.5 to 4% essential oil of the weight of the fruits. The oil yield of *C. cyminum* is 2.5 to 4% of the weight of the fruits and the main constituent of essential oil is cuminol (Sepehri et al., 2014). Higher antioxidant power is shown by *C. cyminum* and this property made it a virtuous source of natural antioxidant (Ghasemi, Fattahi, Alirezalu, & Ghosta, 2019). The methanolic extract of this spice revealed higher antioxidant activities than the essential oil (Einafshar et al., 2012).

Anti-fungal Activity

There is an emerging threat of infections caused by pathogenic fungi increasingly known to public health. During recent years, the rise in the occurrence of fungal infections is owing to development in the immune-compromised population, such as HIV and malignancy patients or organ transplant recipients. These problems are related to poisonous throughout treatment with more than a few antifungal drugs and resistance to antibiotics. For the treatment of fungal infections, there are many natural product-based and synthetic drugs available but they are not consistently effective. Moreover, the evolution of resistance in fungi against most of the drugs has now been testified for several years. Plants yield a great number of secondary metabolites, many of them with antifungal activity (I. Ahmad et al., 2010). The essential oil extracted from *C. cyminum* express antifungal activity against the isolated fungus that also belongs to the occurrence of some compounds in its chemical composition such as Cumin aldehyde, Pinene, and P-cymene. Because these and other phenolic compounds of *C. cyminum* oil can inhibit some significant fungal enzymes like Pectinase which is used to hydrolyze the fruit cell wall and invade the host cell by the fungi (Abdul-jabbar, 2017).

Medicinal uses of cumin

C. cyminum has numerous actions like strength, enhancing vision, and lactation. Its seed has been used for traditional treatment of toothache, epilepsy, dyspepsia, and jaundice. It has several pharmacological effects including immunologic, anti-diabetic, antimicrobial, and anti-tumor activities. Powerful exterior or interior anti-inflammatory, antiseptic, anti-enzymatic action, an analgesic, sedative, and stimulant properties shown by the essential oil of *C. cyminum* (Patil et al., 2017).

C. cyminum can lessen nausea and illness, even during pregnancy (Bansal et al., 2014). Its seeds are stimulant, antispasmodic, diuretic, aphrodisiac, emmenagogue, carminative, and astringent. These are also useful in diarrhea and dyspepsia, mainly in veterinary medicine. It is considered also very cooling, prescribed for whooping cough, the spitting up of blood, spasmodic cough and enters into most of the prescriptions for gonorrhea. It is used as a lactagogue. *C. cyminum* seed is arranged for snake-bite and scorpion-sting (Rai et al., 2012). In Indonesia, it is used in cases of bloody diarrhea and headache. It is used for kidney and bladder stones, chronic diarrhea, leprosy, and eye disease (Agarwal et al., 2017).

Conclusions

C. cyminum has numerous actions like strength, enhancing vision, and lactation. Its seed has been used for traditional treatment of toothache, epilepsy, dyspepsia, and jaundice. It has several pharmacological effects including immunologic, anti-diabetic, antimicrobial, and anti-tumor activities. Antioxidant activities and the total phenolic content also found a good correlation among their nonvolatile extracts. So, it concludes that there is good antioxidant potential in *C. cyminum*. This spice can be utilized to yield flavoring agents as well as novel natural antioxidants that can be used in several food products. *C. cyminum* powder (1.25%) containing diet was known to be unusually beneficial in streptozotocin-induced diabetic rats as designated by the reduction in glucosuria, improved body weights, hyperglycemia, depressed blood urea, low excretion of urea and creatinine in diabetic animals. *C. cyminum* (0.5% g) per kg body weight orally directed in rats with induced diabetes is described to

decrease blood glucose levels. It might be due to suppression of aldose reductase and alpha-glucosidase. The essential oil extracted from *C. cyminum* express antifungal activity against the isolated fungus that also belongs to the occurrence of some compounds in its chemical composition such as Cumin aldehyde, Pinene, and P-cymene. Because these and other phenolic compounds of *C. cyminum* oil can inhibit some significant fungal enzymes like Pectinase which is used to hydrolyze the fruit cell wall and invade the host cell by the fungi.

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