



ISSN (E): 2320-3862
ISSN (P): 2394-0530
www.plantsjournal.com
JMPS 2024; 12(4): 435-439
© 2024 JMPS
Received: 08-06-2024
Accepted: 12-07-2024

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Medicinal properties of some commonly used spices: A review

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DOI: <https://doi.org/10.22271/plants.2024.v12.i4e.1738>

Abstract

Natural products of plant origin have proved to be a novel source of antimicrobial botanicals with no side effects. Secondary metabolites from plants act as defense agents against pathogenic microbes. From times unknown spices and condiments have been used by humans as food, medicines and even food preservatives. Spices are compulsory part of Indian kitchens and have played a key role as natural alternative to control food poisoning diseases. Spices are characterized for a broad range of secondary metabolites which prevent bacterial and fungal growth and even contain flavor quality factors. In present review medicinal properties of some commonly used spices such as black pepper, clove, ginger, coriander, garlic, cinnamon, turmeric, mustard, cumin and carom seeds have been taken into consideration. Spices not only enhance the flavor of foods but also are known for their antimicrobial, preservative and antioxidant properties.

Keywords: Spices, cinnamon, cumin, turmeric, clove.

Introduction

India is one of the largest producer, consumer and exporter of spices. India grows over fifty spices out of the eighty-six grown worldwide. When one considers the need of its own vast population, India must be the world leaders in the area of cultivation of spices. Spices constitute an important group of agricultural commodity. It is virtually indispensable in the culinary art. They also play an important role in our national economy. On the world market, about twenty major spices are traded. They are included under raw crude medicinal plant materials in the export-import data^[40]. Indian spices have played a major role in the food business and the medical system for millennia. A wealth of knowledge on issues with healthcare and the environment may be found in ancient literature. Indian spices have long been utilized in various traditional medical practices, such as Sino-Tibetan, Unani, and Ayurvedic systems. The primary knowledge source that influenced the creation of Ayurveda is the Vedic text, which dates back to 2500 B.C. Spices played a significant role in the treatment of major bodily ailments, especially in Ayurveda. Spices are one of the main ingredients in the majority of formulations used in homeopathic medicine. Natural herbs and spices were used as medication or added to food in ancient India to preserve good health, hygiene, and sanitation and lengthen life expectancy^[13, 14]. Many plants have antibacterial properties and are used to treat a variety of illnesses^[21, 10, 4]. Indian cuisine and medicine make substantial use of clove, ginger, cumin, and caraway. Garlic, with its antimicrobial qualities are frequently employed for a variety of infections-related disorders. Eugenol, a principle of clove active has both a local anesthetic and antiseptic properties activity; as a result, toothaches are treated with it.^[51] Some commonly used spices are as follows:

1. Black pepper

Botanical name is *Piper nigrum* L. is an annual vine belongs to family *Piperaceae*. It was initially grown in India. It is used as a spice and has several medical benefits. Moreover, it was utilized in perfumes, medicine, and as a preservative^[46]. Due to their stimulation of the pancreatic and intestinal enzymes, these ingredients aid indigestion^[58]. It was utilized in ayurvedic medicine to treat skin inflammations, sinusitis, epilepsy, and congestion of the nose^[20]. In addition to its antispasmodic and antipyretic properties, piperene exhibits antibacterial, antifungal, anticancer, analgesic, larvicidal, and insecticidal properties^[46].

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It also have antiseptic, gastroprotective, antiulcerogenic, anticancer, anti-inflammatory, insecticidal, analgesic, anticonvulsant, and antioxidant qualities. Piperine also increases the absorption and bioavailability of other bioactive substances [17, 38].

2. Clove

Botanical name is *Syzygium aromaticum* syn. is an aromatic dried flower bud of a tree belongs to family *Myrtaceae*. Cloves' common application in the treatment of toothache discomfort is just one illustration of its pharmacological advantages. Additionally, clove extracts are utilized as antiseptics to eradicate microorganisms, as a result it shows that clove extracts have antimicrobial properties. Many researchers explained the effectiveness of bioactive clove extracts as antibacterial and antifungal agents [9, 15, 29, 43, 50]. According to, it is effective against oral microorganisms linked to periodontal disease and dental caries [8]. The main ingredient in clove oil, eugenol, exhibits antioxidant properties [36]. The presence of phenolic chemicals such as eugenol, thymol, and eugenol acetate was responsible for clove oil's high antioxidant activity [34, 56].

3. Ginger

Botanical name is *Zingiber officinale* herbaceous flowering plant belongs to family *Zingiberaceae*. Numerous scientists have confirmed that certain plants possess antibacterial qualities. Among them is *Zingiber officinale* which is widely used as a spice, flavoring, and herbal cure around the world and has numerous medicinal, nutritional, and ethno medical uses [2]. It is widely used as a spice, flavoring, and herbal cure around the world and has numerous medicinal, nutritional, and ethno medical uses [11]. Plant rhizomes are rich sources of essential oils that are mostly analeptic, fragrant, and stimulating in nature. These oils contain a variety of compound terpenoid combinations. The essential oils of ginger plants are known to include a variety of terpenoid complexes that include physiological, anti-inflammatory, anti-cancer, anti-inflammatory, antidiabetic, anti-HIV, antioxidant, antibacterial, and chemo preventive properties [34]. Ginger is the most often used spice in the world, ingested by people, second only to black pepper. Ginger is categorized morphologically as gajah, or elephant, red, and emprit ginger [54]. It is used to treat a variety of conditions in conventional medicine, including rheumatism, fever, dementia, arthritis, sore throats, discomfort, vomiting, indigestion, sprains, and infectious diseases. Since it possesses antibacterial properties, bacterial infections may be treated with it [5].

4. Coriander

Botanical name is *Coriandrum sativum*, feathery annual plants belongs to family *Apiaceae* parts of which are used as both an herb and a spice. *Coriandrum sativum*, also known as Dhaniya, is a highly esteemed medicinal tree in Ayurveda. Different parts of *Coriandrum sativum* have been cultivated for their essential oil, fatty acids, flavonoids, and steroids. The plant's leaves, seeds, flower, and fruit are among its parts that possess various properties, including antioxidant, antifungal activity, anti-diabetic, antihelminthic, anti-mutagenic, soporific-hypnotic, diuretic, anticonvulsant, cholesterol-lowering, anti-feeding, anticancer, anxiolytic, hepatoprotective, anti-ulcer, anti-protozoal properties [59]. Additionally, it is utilized to relieve joint discomfort and to cure rheumatism, diarrhea, dysentery, and indigestion. Coriander's essential oil and other extracts have antimicrobial,

antimutagenic, and antioxidant properties [60].

5. Garlic

Botanical name is *Allium sativum*, perennial plants belongs to family *Amaryllidaceae*. The health advantages of garlic and other *Allium* species, including onions, leeks, shallots, scallions, and chives, have long been recognized. Garlic was utilized as a medicine by the Babylonians, Egyptians, Phoenicians, Greeks, and Romans to treat digestive problems, respiratory illnesses, skin conditions, bacterial infections, worms, wounds, and tumors [7]. According to available records, garlic was widely utilized in World War II to cure troops' wounds and to stop the spread of infection when applied directly to wounds. Over 3,000 publications—1,000 of which were released in the last ten years—have provided scientific evidence in favor of the use of garlic in ethnomedicine. Numerous population-based research studies have demonstrated a correlation between higher garlic consumption and a lower incidence of gastrointestinal tract malignancies. Garlic's antimicrobial qualities could be the source of its effect [44]. It lowers serum cholesterol, lowers blood pressure, prevents atherosclerosis, and lowers the risk of prevalent brain illnesses including dementia and Alzheimer's. On the other hand, using garlic incorrectly might have negative effects like upset stomach and platelet malfunction [22, 31].

6. Cinnamon

Botanical name is *Cinnamomum verum*, is a bushy evergreen tree of the laurel belongs to family *Lauraceae* and the spice derived from its bark. Bloating, nausea, flatulence, colic, and gastrointestinal tract spastic disorders have all been traditionally treated with *C. verum* [52]. The two most significant elements of the essential oils are eugenol and cinnamon aldehyde. Cinnamaldehyde (E) is the compound that gives cinnamon its anti-tyrosinase properties [28, 30]. Food-borne pathogens such as *Staphylococcus aureus*, *Bacillus cereus*, *Enterococcus faecali*, *Escherichia coli* and *Proteus mirabilis* were all susceptible to the antibacterial properties of the bark aqueous extract [41]. *Bacillus* species and *S. aureus* were inhibited by cinnamon extract on agar plates [23]. Cinnamaldehyde is the primary constituent. This substance inhibits the action of the corresponding enzymes, the function of membranes, and the manufacture of cell walls, exhibiting antibacterial properties against harmful bacterial strains. It was used in ancient medicine to treat dermatitis, arthritis, high blood pressure, toothaches, wound healing, and irregular menstruation [26]. The concentration of cinnamon extracts has an increasing inhibitory effect on bacterial growth. Using a bacterial strain, the antibacterial activity of the hydrolysate of several plants, including thyme, mustard, cinnamon, cardamom, clove, and basil, was assessed. In comparison to the *P. aeruginosa* strain, *S. aureus* has the highest sensitivity to cinnamon hydrosol [55].

7. Turmeric

Botanical name is *Curcuma longa*, a rhizomatous herbaceous perennial plant belonging to family *Zingiberaceae*, which is native to tropical South Asia. Most commonly, it is grown in tropical countries like China, India, and Pakistan. Turmeric was once widely used to treat hepatic, biliary, and diabetic wounds as well as coughs, anorexia, and anorexia. Turmeric's antibacterial, antihelminthic, anticancer, antiparasitic, antiseptic, anti-oxidative, anti-inflammatory, anti-rheumatic, anti-tumor, anti-phlegmatic, antiviral, astringent, aromatic,

blood purifier, clear skin tone, remove wound maggots, hepatoprotective, stop liver obstruction, heals wound, stimulant and sedative in the food industries, as well as an additive to add flavor to curries are just a few of the actions of turmeric that have been described in classical literature [1]. Turmeric functions as a therapeutic agent against a range of chronic complications, including diabetes, cancer, cardiovascular issues, inflammatory disorders, and neurological conditions like Parkinson's disease, Alzheimer's disease, and epilepsy [37]. In addition to being used as a blood purifier, it is used to treat wounds, parasitic skin infections, acne, colds, liver illness, and urinary tract infections. It is also used to treat periodontitis and gingivitis, reducing pain and bleeding [39].

8. Mustard

Botanical name is *Brassica nigra* belongs to family *Brassicaceae*. Its active ingredients in *Brassica juncea* seeds and oils have been shown to have hypoglycemic [47], anticancer [6] and hair control properties when used in cosmetic products [27]. Mustard oil is used as plasters to treat pneumonia and bronchitis, as well as rheumatism and arthritis. It can also be used as a foot soak for sore feet. Additionally, it has been used as a diuretic, emetics, and hunger stimulant [61].

Mustard seeds antibacterial activity was tested against *Salmonella typhi*, *B. cereus*, *P. aeruginosa*, *E. coli*, and *S. aureus*; the plant extract showed a broad spectrum of antimicrobial qualities [35]. Seeds are utilized as a flavoring agent as well as a spice. The seeds of *B. nigra* are used to treat throat tumors, joint pain, and tooth ache because of their therapeutic qualities [18]. Mustard contains biological substances that can be used to treat a variety of illnesses, including diabetes, cancer, and inflammatory immunological disorders, it is employed as a medicinal plant. Due to its extensive production and seeding, it is widely utilized as food worldwide [64].

9. Cumin

Botanical name is *Cuminumcyminum* L., belongs to family *Apiaceae* is an annual herb native of Syria and Egypt. Since ancient times, dried fragrant plant pieces have been used to prepare and preserve food. These portions are known as spices. They are often utilized to provide food items more flavor, color, and shelf life [49]. The process by which sensory neurons inhibit a painful sensation is known as antinociception. The bioactives in cumin have an antinociceptive effect [48]. Protein, tannin, saponin, terpenes, flavonoids, alkaloids, tannic acids, anthocyanin, coumarin, glucosides, and many other medicinally active substances are abundant in them. They have positive impacts on health against a variety of conditions, including cancer, oxidative stress, inflammation, diabetes, cardiovascular disease, neurodegenerative disease, wound healing, and anomalies of the reproductive system. Along with many other conditions, its bioactive components are advised to treat stomachaches, convulsions, inflammation, rheumatic discomfort, colds, coughs, loss of appetite, and many more [3].

10. Carom seeds

Botanical name is *Trachyspermum ammi* (L.) belongs to family *Apiaceae* is an important seed spice. Ajwain fruits have a tubular appearance and a potent, aromatic scent that is similar to the plant's thymol content [12, 24]. Its essential seeds are acknowledged as a traditional medicine to treat

gastrointestinal disorders like flatulence, diarrhea, indigestion, and colic. Important antibacterial, anti-inflammatory, antifungal, oxidative, cytotoxic, nematicidal, antifilarial, anthelmintic, and antilarvacidal properties have also been documented for its essential oil [32, 53, 65]. Few studies have shown that essential oil from India has bactericidal activity against pathogenic bacteria such *Salmonella typhimurium*, *Escherichia coli*, *Staphylococcus aureus*, and *Klebsiellapneumoniae* [33, 42, 45, 63]. Numerous chemical components of the herb have been identified. Ajwain has been found to contain the following phytochemical constituents: fiber (11.9%), carbohydrates (24.6%), tannins, glycosides, moisture (8.9%), protein (17.1%), fat (21.1%), saponins, flavones, and other components (7.1%) involving calcium, phosphorous, iron, cobalt, copper, iodine, manganese, thiamine, riboflavin, and nicotinic acid [16, 62]. The agar diffusion assay was used to investigate the antibacterial effectiveness of Ajwain, acetone, and aqueous extracts against *Enterococcus faecalis*, *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Salmonella typhi*, *Salmonella typhimurium*, *Shigella flexneri*, and *Staphylococcus aureus* [25]. According to the study, acetone extract exhibits higher levels of activity than aqueous extract. Ajwainethanolic extract shown antibacterial efficacy against eight strains of *Helicobacter pylori* in a different investigation [57].

Conclusion

Globally 25% of the plants have been tested for their pharmacological efficacies and a substantial amount of new drugs have been introduced in marked which are of natural or semisynthetic origin. Due to repetitive use of antibiotics, the microbes are becoming resistant which leads to search of new treatments from natural substances to combat against infectious diseases effecting both humans and animals. Medicinal plants are backbone of traditional medicines and spices also contribute a great part of this method of treatment owing to presence of variety of bioactive substances. In recent decades, researchers are keenly interested in antimicrobial drugs from natural products as they are safe and more dependable as compared to synthetic drugs. The present review suggest that drugs derived from spices has the recognition of the validity of many traditional claims regarding the value of spices in human health care. Hence, more studies related to the use of spice plants as therapeutic agent should be emphasized with significant interest in controlling antibiotic resistant microbes.

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