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PHYTOCHEMISTRY, PHARMACOLOGY AND MEDICINAL PROPERTIES OF CORIANDRUM SATIVUM L

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Annotation
This article is devoted to open medicinal properities of Coriandrum sativum L and its usage in pharmacology.

Key words: Coriandrum sativum, apiaceae, phytochemistry, pharmacology.

Introduction.

Coriandrum sativum L. commonly known as "Coriander" is an annual small plant like parsley which dates back to around 1550 BC, and is one of the oldest spice crops in the world. It belongs to Apiaceae family in the order of Apiales that contains about 300 genera and more than 3000 species C. sativum probably originated from Eastern Mediterranean and it is spread as a spice plant to India, China, Russia, Central Europe, and Morocco, and has been cultivated since human antiquity . India is the largest producer of coriander which is used extensively in curry powder. Coriander has been known as "Geshniz" in Iran. C. sativum is an annual, herbaceous plant that grows 25 to 60 cm in height. It has thin, spindle-shaped roots, erect stalk, alternate leaves , and small, pinkish-white flowers. The plant flowers from June to July and yields round fruits consisting of two pericarps. These fruits are almost ovate globular and there are many longitudinal ridges on the surface. The length of this fruit is 3 to 5 mm and the color, when dried, is usually brown, but may be green, straw-colored or off white . The plant is grown widely all over the world for seed, as a spice, or for essential oil production . The whole or ground seed (fruit) is an ingredient of pickling spices also used to flavor various commercial foods, particularly, to prepare some instant soups and dishes, in many cakes, breads and other pastries, alcoholic beverages, frozen dairy desserts, candy, and puddings. The fruit's essential oil is a common ingredient in creams, detergents, surfactants, emulsifiers, lotions, and perfumes . There are two varieties of C. sativum: vulgare Alef. andmicrocarpum DC. These varieties differ in the fruit size and oil yield: vulgare has fruits of 3 to 5 mm diameter and
yields 0.1 to 0.35% essential oil, while microcarpum fruits are 1.5 to 3 mm and yield 0.8 to 1.8% essential oil .The green leaves of coriander are known as "cilantro" in the United States, and are consumed as fresh herb in preparing chutneys, sauces, in flavoring curries and soups. The fruits are mainly responsible for the medical use of coriander and have been used as a drug for indigestion, against worms, rheumatism, and pain in the joints . The fruit extract is used in lotions and shampoos as an antibacterial agent.

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There are records that it is effective for relief of insomnia, anxiety, and convulsion . It is also used for sub-acid gastritis, diarrhea, and dyspepsia of
various origins as well as for its digestive stimulation, stomachic, and antibilious properties . In folk medicine, coriander is used against intestinal parasites .. Coriander has been reported to possess strong lipolytic activity and, as a member of Apiaceae family, its use has been suggested with caution, because of potential allergic reactions from furanocoumarins . Coriander leaves are widely used as folk medicine as carminative, spasmolytic, digestive, and galactagogue. It has the advantage of being more stable and of retaining its agreeable odor longer than any other oil of its class . A number of chemical constituents such as volatile constituents, flavonoids, isocoumarins, and coriandrones have been isolated from different parts of the plant . From current pharmaceutical studies, additional pharmaceutical applications of C.
sativum have revealed antibacterial ,antifungal , antioxidant, hepatoprotective antihelmintic , anticonvulsant , protection of gastric mucosal damage, hypocholestrolemia and antileishmania, gut modulatory, blood pressure lowering, and diuretic activities among others.

Chemical Composition

The odor and flavor of mature fruits and fresh herbage are completely different. While aliphatic aldehydes mainly C10 to C16 aldehydes) with fetid-like aroma are predominant in the fresh herb oil, major components in the oil isolated from coriander fruit include oxygenated monoterpenes and monoterpene hydrocarbons .The most important constituents of coriander fruits are the essential oil and fatty oil. The essential oil content of
dried coriander fruits varies between 0.03 and 2.6%, while the fatty oil content varies between 9.9 and 27.7%. Other constituents including crude protein, fat, crude fiber, and ash contents vary from 11.5 to 21.3%, 17.8 to 19.15%, 28.4 to 29.1%, and 4.9 to 6.0%, respectively . The essential oil content of the dried coriander fruits varies from 0.1 to 0.36%. Linalool (40.9 to 79.9%) , neryl acetate (2.3 to 14.2%), γ-terpinene (0.1 to 13.6%), and α-pinene (1.2 to 7.1%) were identified as the main components in the oil of the coriander fruits cultivated in Iran , while linalool (37.7%), geranyl acetate (17.6%), and γ-terpinene
(14.4%) were characterized as the main ones in Bangladesh coriander cultivars. The leaf oil contained mostly aromatic acids, including 2-decenoic acid (30.8%), E-11-tetradecenoic acid (13.4%), capric acid (12.7%), undecyl alcohol (6.4%), tridecanoic acid (5.5%), and undecanoic acid (7.1%) as major constituents . Analysis of Kenya coriander leaves essential oil showed the presence of 2E-decenal (15.9%), decanal (14.3%), 2E-decen-1-ol (14.2%), and n-decanol (13.6%) as the main ones (Matasyoh et al., 2009). The commonly known phytochemicals from C. sativum are volatile components, flavonoids, isocoumarins, fatty acids, sterols, and coriandrones, coumarins, catechins, polyphenolic compounds .
Antioxidant activity . An antioxidant is defined as any substance that, when
present at low concentrations as compared to those of an oxidizable substrate, significantly delays or prevents oxidation of that substrate . Antioxidants are of interest to biologists and clinicians,

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because they help to protect the human body against damages induced by reactive free radicals generated in atherosclerosis, ischemic heart disease, cancer, Alzheimer's disease, Parkinson's disease, and even in aging process . There are many evidences that natural products and their derivatives have efficient anti-oxidative characteristics, consequently linked to anti-cancer, hypolipidemic, anti aging, and anti-inflammatory activities . Anti-oxidative capacities of different parts of C. sativum were evaluated by three methods, including determining its effect on scavenging the (DPPH) radical, inhibition of 15-lipoxygenase (15-LO), and inhibition of Fe induced porcine brain phospholipid peroxidation. The leaves showed stronger antioxidant activity than the fruits. Positive correlations were found between total phenolic content in the extracts and antioxidant activity.
Polyphenolic compounds are present in C. sativum, and are known to be excellent antioxidants. They have the capacity to reduce free-radical formation by scavenging free radicals and protecting antioxidant defenses. The antioxidant potencies of polyphenolic compounds from C. sativum against hydrogen peroxide-induced oxidative damage in human lymphocytes have also been shown. H_2O_2 treatment significantly decreased the activities of antioxidant enzymes, such as superoxide dismutase, catalase, glutathione peroxidase, glutathione reductase, glutathione-S-transferase, and caused decreased glutathione content and increased thiobarbituric acid-reacting substances (TBARS). Treatment with polyphenolic fractions (50 μg/ml) increased the activities of antioxidant enzymes and glutathione content and reduced the levels of TBARS significantly. Polyphenolic compounds are effectively responsible for suppression of hydrogen peroxide-induced oxidative stress .

Conclusion

The objective of this review has been to show the recent advances in the exploration of C. sativum as phytotherapy and to illustrate its potential as a therapeutic agent. With this present information, it is evident that C. sativum has pharmacological functions including antioxidant, antibacterial, antifungal, antidiabetic, hepatoprotective, and antihyperlipidemic
activities, among others. As this present information shows, it is also possible that the fruit‟s essential oil or the whole plant extract might be useful in the
development of new drugs to treat various diseases. However, the present results suggest a possibility that volatile components and polyphenolics can be further developed as a potential disease-curing remedy. It must be kept in mind that clinicians should remain cautious until more definitive studies demonstrate the quality and efficacy of C. sativum. For these reasons, extensive pharmacological and chemical experiments, together with human metabolism will be a focus for future studies. Finally, this review emphasizes the potential of C. sativum to be employed in new therapeutic drugs and provides the basis for future research on the application of transitional medicinal plants.

ISSN: 2776-1010 Volume 3, Issue 4, Apr, 2022

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ISSN: 2776-1010 Volume 3, Issue 4, Apr, 2022

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