

Spices as Natural products and their medicinal values

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Abstract

A number of plants are used the world over as spices, which in a very small amount produce a desirable flavour in the food cooked. Every spice imparts a specific flavour to the food in which it is added. Apart from the use of spice plants as flavouring agents, they are used in the treatment of a variety of ailments. It is due to the presence of some specific chemicals called Active principles which target a particular ailment. They may act as antimicrobial, antilithic, analgesic, anthelminthic antidiabetic, antipyretic and even anticarcinogenic. For instance the active principles eugenol and linalool come from bay leaf, curcumin from turmeric, cuminaldehyde from cumin. Zingiberene from ginger, monoterpene oxides & carbonyls from coriander and Capsaicinoids from chillies.

Spice is a dried seed, fruit, root, bark or vegetative material used in nutritionally insignificant amount as a food supplement for the reason of flavoring. Spices are defined as “a strongly flavored or aromatic substance of vegetable origin, obtained from tropical plants, commonly used as a condiment”. Some Spices are reputed to possess several medicinal and pharmacological properties and hence find position in the preparation of a number of medicines.

In ancient times many of spices had played a vital role in the lifestyle of people from certain part of the world. Herbs and spices have been used for generations by humans as food taste and to treat ailments. These were

used as colouring, flavoring and preserving agents and as well as food additives and medicines. They were used for ailments of the liver, kidney and stomach some of them act as Antifungal and Antibacterial agents. The active photochemical derived from these spices have provided the molecular basis for their actions. India is the most recognized country for the spices and traditional medicines having physiological and pharmacological properties. The aim of this work is to review the nutritional and health benefits of some common spices mostly used in India.

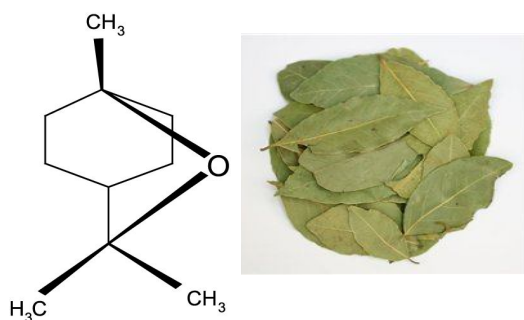
Cooking is the process to extracting the chemicals. The watery media helps the reactions. The chemicals volatility depends on

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temperature, by applying more heat, faster they come out, for this reason some spices are added in the course of cooking, so the release of chemicals is slow. In frying, fats can reach temperatures higher than the boiling point of water, and are often used to conduct high heat to ingredients and help them to come out. Relevant literature has been consulted for the preparation of the manuscript.

Some medicinal plants & spices

Bay Leaf (*Cinnamomum tamala* (Buch.-Ham.) T. Nees & C.H. Ebern.)



1,8-cineole

In fresh bay leaves, 1,8-cineole was the major component, together with α -terpinyl acetate, sabinene, α -pinene, β -pinene, β -elemene, α -terpineol, linalool and eugenol. In ancient times bay leaves were used medicinally for a number of things. They were used for ailments of the liver, kidney and stomach and were also thought to alleviate wasp and bee stings. An infusion of bay leaves will promote sweating, which will help clear up flu and feverish symptoms. Bay leaves settle the stomach and help to treat digestive disorders. It contains to some extent parthenolides, which have proven useful in the treatment of migraines. Bay leaf has also been

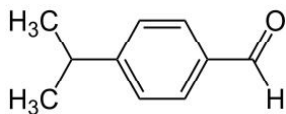
shown to help the body process insulin more efficiently. Bay leaf contains eugenol which has anti-inflammatory and antioxidant properties.

Turmeric (*Curcuma longa* L.)



Turmeric contains up to 5% essential oils and up to 5% curcumin, a polyphenol. Curcumin is the active substance of turmeric. It is a natural antiseptic and antibacterial agent, useful in disinfecting cuts and burns. When combined with cauliflower, it has shown to prevent prostate cancer and stop the growth of existing prostate cancer.

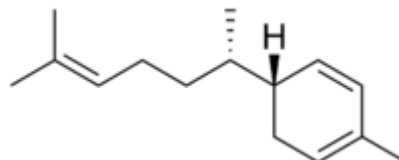
May prevent melanoma and cause existing melanoma cells to commit suicide. May prevent and slow the progression of Alzheimer's disease by removing amyloid plaque buildup in the brain. It is a potent natural anti-inflammatory that works as well as many anti-inflammatory drugs but without any side effects. Boosts the effects of chemo drug paclitaxel and reduces its side effects. Is a natural painkiller. May aid in fat metabolism and help in weight management. Has long been used in Chinese medicine as a treatment for depression. Has been shown to stop the growth of new blood vessels in tumors. In particular, these compounds block several enzymes require for the growth of tumors and may therefore have a role to play in future cancer treatments. Speeds up wound healing and assist in remodeling of damaged skin.

Cumin (*Cuminum cyminum* L.)**cuminaldehyde**

Cumin's distinctive flavor and strong, warm aroma are due to its essential oil content. Its main constituent and important aroma compound is cuminaldehyde. Other important aroma compounds of toasted cumin are the substituted pyrazines. Other components include β -pinene and γ -terpinene. The active principles in the cumin may increase the motility of the gastro-intestinal tract as well as increase the digestion power by increasing gastro-intestinal enzyme secretions. Cumin seeds contain numerous phyto-chemicals that are known to have antioxidant, carminative and anti-flatulent properties. The seeds are an excellent source of dietary fibre.

This spice is an excellent source of minerals like iron, copper, calcium, potassium, manganese, selenium, zinc and magnesium. *Copper* is required in the production of red blood cells. Iron is required for red blood cell formation. *zinc* is a co-factor in many enzymes that regulate growth and development, sperm generation, digestion and nucleic acid synthesis. *Potassium* is an important component of cell and body fluids that helps controlling heart rate and blood pressure. *Manganese* is used by the body as a co-factor for the powerful anti-oxidant enzyme, *superoxide dismutase*.

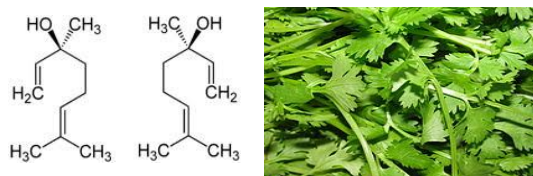
It also contains very good amounts of B-complex vitamins such as thiamin, vitamin B-6, niacin, riboflavin, and other vital anti-oxidant vitamins like vitamin E, vitamin A and vitamin C. The seeds are also rich source of many flavonoid phenolic anti-oxidants such as carotenes, zeaxanthin, and lutein¹⁻⁵.

Ginger (*Zingiber officinale* Roscoe)**Zingiberene**

Ginger is one of the most extensively used spices because of its wide range of application. It is used fresh and in the preserved or dried form. The potential of ginger in the culinary, non-culinary and medicinal fields is based on the chemistry of volatile oil and non-volatile pungent principles. The main compound in ginger oil is Zingiberene. But it also consists of pungent compound of hydrocarbon, alcohols (Gingerols), Carbonyl compounds (Zingerones) etc. which produce a 'hot' sensation in our mouth. Gingerols increase the motility of the gastrointestinal tract and have analgesic, sedative, antipyretic and antibacterial properties.

Ginger oil has been shown to prevent skin cancer in mice and a study at the University of Michigan demonstrated that gingerols can kill ovarian cancer cells. The chemopreventive potentials of gingerol present a promising future alternative to expensive and toxic therapeutic agents. Particularly gingerols and shogaols, which form from gingerols when ginger is dried or cooked. Zingerone is also produced from gingerols during this process; this compound is less pungent and has a spicy-sweet aroma. Ginger is also a minor chemical irritant.

Coriander (Coriandrum sativum L.)

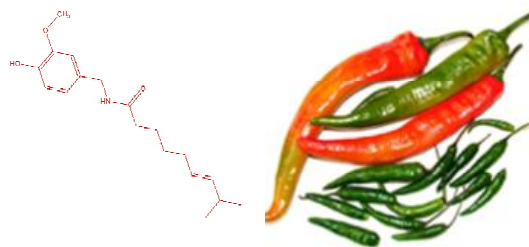


Linalool

The coriander plant is highly recommended for anxiety and insomnia in many countries and usually consumed uncooked. Coriander are Monoterpene hydrocarbons, Monoterpene oxides and carbonyls, Monoterpene alcohols, Monoterpene esters, & other Miscellaneous compounds of Aliphatic hydrocarbons, alcohols and aldehydes. Coriander, like many spices, contains antioxidants, which can delay or prevent the spoilage of food seasoned with this spice. A study found both the leaves and seed to contain antioxidants, but the leaves were found to have a stronger effect. Chemicals derived from coriander leaves were found to have antibacterial activity against *Salmonella choleraesuis*, and this activity was found to

be caused in part by these chemicals acting as nonionic surfactants. Coriander has been documented as a traditional treatment for type 2 diabetes. A study on mice found coriander extract had both insulin-releasing and insulin-like activity. Coriander seeds were found in a study on rats to have a significant hypolipidaemic effect, resulting in lowering of levels of total cholesterol and triglycerides, and increasing levels of high-density lipoprotein. This effect appeared to be caused by increasing synthesis of bile by the liver and increasing the breakdown of cholesterol (which causes blockage of heart) into other compounds. The oils of coriander also having an anti-microbial properties and well recommended for urethritis and urinary tract infection.

Chili (Capsicum annum L.)



Chili contains many chemicals, including water, fatty oils, steam-volatile oil, carotenoids, capsaicinoids, resin, protein, fibre and mineral elements. Many of these chemicals have importance for nutritional value, taste, colour and aroma. The two most important groups of chemicals found in chili are the carotenoids and capsaicinoids. The colour of chili spice powder is due to the presence of red-pigmented carotenoids. However, when chilies are processed by drying and then grinding into spice powder, the carotenoids

auto-oxidize easily, due to the effects of heat, light and oxygen. This leads to a more orange and less intense coloration that devalues the spice powder. The pungency of chili is attributed to the five natural capsaicinoids. Chilies are high in vitamin C (about twice that of citrus fruits) Even after cooking it only loses 30 percent of its vitamin C. Dried chilies are very high in vitamin A Red chilies are a great source of β -carotene. Chilies have antibacterial qualities, and contain bioflavonoids. It is effective in protecting against cancer. The pharmaceutical industry uses capsaicin as a counter-irritant balm for external application. If powdered red chili is applied to the part affected by a dog bite, immediately it minimizes the affect of the poison. The capsaicin is used to alleviate pain. Its mode of action is thought to be from nerve endings releasing a neurotransmitter called substance 'P'. Substance P informs the brain that something painful is occurring. Capsaicin causes an increase in the amount of substance P released. Eventually, substance P is depleted and further releases from the nerve ending are reduced. The protective effect of chili against peptic ulcer. Red pepper and natural and synthetic capsaicin in the diet significantly decreased cholesterol in the liver. Boil water, in which powdered red chili has been mixed, sprinkle this water on those areas where bed bugs are present, bed

bugs will be eliminated.

These are the few examples only. But so many spices are there used in daily as food additives or arurvedic medicines directly or indirectly. But whatever may be, behind their tastes & medicinal values some chemicals are responsible for that. Among these one or two substances are very active. So, it is very important to a chemist to identify the active chemicals, extracting and processing for using properly. It may remember that very small and adequate amount of spice should add to food. Excess spicy food causes digestive disorder and gradually generates a lot of problems in digestive mechanism. Same thinking is also true for using in medicinal purpose i.e. excess use may cause side effects¹.

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