

5. SPICES & CULINARY HERBS FOR A BETTER HEALTH

5.1. NUTRITIONAL PROFILE

5.2. SPICES AND CULINARY HERBS AS SALT ALTERNATIVE

5. SPICES & CULINARY HERBS FOR A BETTER HEALTH

The most recent attention given to spices and culinary herbs by the consumer is due to the disclosure of numerous studies that focus on the use of the advantages of these products, which combine the aroma and flavor and beneficial properties such as antimicrobial and antioxidant capacities. In this sense, the natural products are presented as an alternative to chemical compounds used in the prevention and treatment of certain diseases, because it is believed that can elicit fewer side effects in the patients when compared with the conventional drugs. In addition to the ecological and environmental status, most of these plants is quite affordable, which pleases, of course, consumers, especially those who are starting to change their daily practices, to adopt a healthier lifestyle.

The metabolites present in plants are scientifically grouped into primary and secondary metabolites. The former are involved in basic survival processes as respiration or photosynthesis, and the latter are linked to defense and signaling processes. The plant compounds with biological activity are generally composed of secondary metabolism, and are subdivided into three main groups: terpenoids, phenolic compounds and nitrogen compounds. It is precisely in the secondary metabolism that arise from the active ingredients of medicinal plants. However, when subjected to stress conditions, many species do not produce certain compounds, so it is important to review the circumstances in which they are grown and harvested, but most of all as they grow in order to prove that they meet the conditions desired at the time of use.

5.1. NUTRITIONAL PROFILE

Starting from a philosophical basis different from the conventional medicine, the Complementary and Alternative Medicine is characterized by applying specific treatments, which are believed to be beneficial for prevention and public health. The fact that it employs techniques and methods such as using natural plants, significantly reduces the contact with chemical substances and therefore, negative impacts on health and toxicity. In fact, these natural products require special emphasis on certain problems for which conventional medicine has not yet found effective answers, or at least immediate. However, in general, the activity of medicinal plants is not as instant as the conventional drugs, so it is generally advisable to supplement a supporting element with each other, to bear most desirable effects.

Following this more traditional way of life, knowledge about this type of plants was preserved and disseminated between generations, and is therefore an integral part of the cultural heritage of regions and countries. Nowadays the use of spices and culinary herbs and their essential oils, for example, is widely recommended. According to 2009 data from WHO, it is estimated that 80% of the world population already refer to herbs and medicines in primary health care.

Many of these properties are based on the constitution of spices and culinary herbs, which contain important compounds such as polyphenols. These are structurally diverse components, ranked according to the number of aromatic rings. The main classes of this family of components are phenolic acids, flavonoids, stilbenes and lignans, which can be found in herbs (cilantro, dill, oregano, rosemary, parsley, sage and thyme) and spices (cinnamon, nutmeg, ginger and turmeric). These are particularly high when compared with other foods, such as broccoli, the dark chocolate, the red, purple and blue berries, grapes and yet onion. It is precisely the beneficial properties of polyphenols which have most remarkable biological effects.

Herbs and Spices nutritional and therapeutic properties

Herbs and Spices	Nutritional Properties	Medicinal Properties
Rosemary	Excellent source of vitamins (B1, B2, E, C, and folates) and minerals (K, Ca, Na and P). Also carnosol, carnosic acid,	Stimulates liver function, facilitates digestion, indicated to combat physical

	cineol, geraniol, α -pinene, β -carotene, limonene, naringin, luteolin, caffeic acid, rosmarinic acid, rosmanol and valeric acid	and mental fatigue and depression. It has antioxidant properties and aid in circulation. It should not be used in diarrhea cases. In high concentrations, can cause gastrointestinal irritation and nephritis.
Garlic	Provides vitamins (B1, B2, C, provitamin A and E) and minerals (Se, Ca, I, Na and Fe).	Prevention of cardiovascular disease: reduction of serum concentrations of LDL, triglycerides, lowering of blood pressure, inhibition of platelet aggregation.
Chive	Rich in vitamins A and C.	Antioxidant properties, helps in digestion and improves blood flow.
Coriander	Rich in Fe and vitamin C, carotene and Ca.	Improves motility and gastric secretions, anti-inflammatory and antibacterial properties. The infusion of the leaves still fighting fatigue and some types of migraines.
Dill	High quantities of important fatty acids and phenolic compounds.	Facilitates digestion, indicated for insomnia situations, hiccups, diarrhea, menstrual disorders, respiratory disorders, cancer and also for a good oral health status.
Lemongrass		acts as a soothing, suitable for stomach problems, headache and depression
Tarragon	Provides vitamins (A, B2, B3, B6 and folates) and minerals (Ca, K, Mg and P).	Assists in the proper functioning of the digestive

		system, helps prevent the onset of heart disease, diuretic action.
Fennel	Provides vitamins (A and B3) and minerals (Ca, K, Mg and P).	It acts in the digestive tract, it increases peristalsis and reduces the production of gases. Favors bronchial secretion removing excess mucus from the respiratory tract. The level of potassium salts gives it diuretic properties.
Ginger	Provides vitamins (A and B3) and minerals (Ca, K and P).	Treatment of colds, coughs, relieving symptoms of gout, arthritis, headaches, reduces nasal congestion, menstrual cramps, bowel cancer prevention and ovarian cancer. It has a bactericidal action.
Mint	Rich in vitamins A, B, C and minerals (Ca, Fe and K).	Decongestant, its infusion is indicated for the treatment of influenza. Avoids situations of heartburn and indigestion. Assists in relieving abdominal pain and muscle aches.
Laurel		Diuretic, digestive and prevents gas formation. Assists in the treatment of hemorrhoids and rheumatism.
Basil	Rich in essential oils, vitamins C and A.	Vomiting combat, intestinal cramps and diarrhea. It acts on the urinary tract, enabling

		the kidneys and relieving burning on urination. Relieves cough situations, bronchitis, hoarseness, sore throat, helps heal ulcers.
Oregano	Rich in essential oils and vitamins (A, B3, C, E and folates) and minerals (Ca, K, Fe, P and Mg)	Stimulates gastric and biliary functions. Aids in the treatment of dyspepsia, belching, nausea, flatulence and stomatitis. It is diuretic and alleviates menstrual pain.
Pennyroyal	Rich in vitamins (A and folates), minerals (K and Mg) and flavonoids.	Treatment of flu, cough, insomnia, rheumatism, soothing, bronchitis, asthma.
Parsley	Rich in vitamins (A and C), minerals (Ca, Fe, Mg, S and K) and bioflavonoids.	Diuretic, combats the formation of gases, alleviates the symptoms of bronchitis, asthma, menstrual cramps, assists in the treatment of renal calculi.
Sage	Provides vitamins (A, B3, B6, K and folates) and minerals (Ca, Mg and K)	Reduces flatulence, anti-inflammatory and anti-carcinogenic effects.

Active plant constituents:

Some of the main active constituents in herbs and spices are (Peter, 2012):

- Acids: these are sour, often antiseptic and cleansing;
- Alkaloids: these are bitter, often based on alkaline nitrogenous compounds. They affect the central nervous system and many are very toxic and addictive;
- Anthraquinones: these are bitter, irritant and laxative, acting also as dyes;

- Bitters: various compounds, mainly iridoides and sesquiterpenes with a bitter taste that increases and improves digestion;
- Coumarines: these are antibacterial, anticoagulant;
- Flavones: these are bitter or sweet, often diuretic, antiseptic, antispasmodic and anti-inflammatory. Typically yellow and present in most plants;
- Glycosides: there are four main kinds of glycosides:
 - Cardiac: affecting heart contractions
 - Synogenic: bitter, antispasmodic sedative, affecting heart rate and respiration
 - Mustard oil: acrid, extremely irritant
 - Sulphur: acrid, stimulant, antibiotic;
- Gums and mucilages: these are bland, sticky, soothing and softening;
- Resins: these are acrid, astringent, antiseptic, healing;
- Saponins: these are sweet, stimulant hormonal, often anti-inflammatory, or diuretic, soapy in water;
- Tannins: these are astringent, often antiseptic
- Volatiles oils: these are aromatic, antiseptic, fungicidal, irritant and stimulant.

Antioxidant compounds from herbs and spices:

Spices and herbs have been used for thousands of years for flavour, aroma, as colouring in foods and as preservatives. They contain powerful antioxidants that have been proven to be effective in inhibiting lipid oxidation or slowing down the onset of rancidity in foods. Antioxidants from spices and herbs possess desirable properties such as being natural, non-GMO and having clean label ingredients (i.e., can be listed as spice or herb or flavouring).

Several studies have demonstrated that spices and herbs such as rosemary, sage, oregano have high antioxidant activities and that cumin contained caffeic acid, kaempferol, other flavonoids, volatile and essential oils and coumarins as representative components of its phenolics.

Table 1 shows the different antioxidant compounds found in spices and herbs.

Clove	Phenolic acids (gallic acid), flavonol glucosides, phenolic volatile oils (eugenol, acetyl eugenol), tannins
Ginger	Shogaol, gingerol
Mace	Myristphenone
Marjoram	Beta-carotene, beta-sitosterol, caffeic-acid, carvacrol, eugenol, hydroquinone, linalyl-acetate plant 3–17, myrcene, rosmarinic-acid, terpinen-4-ol
Nutmeg	Myristphenone, phenolic volatile oils, phenolic acid (caffeic acid), flavanols (catechin)

Oregano	Caffeic acid, p-coumaric acid, rosmarinic acid, caffeoyl derivatives, cavacrol, flavonoids
Red pepper	Beta-carotene fruit, beta-sitosterol plant, caffeic acid campesterol, camphene fruit, capsaicin fruit, capsanthin fruit, chlorogenic-acid fruit, eugenol fruit, gamma-terpinene fruit, hesperidin fruit, myristic acid
Rosemary	Carnosol, 12-O-methylcarnosic, rosmanol, caffeic acid, rosmarinic acid, caffeoyl derivatives, phenolic diterpenes (carnosic acid), carnosol, epirosmanol, flavonoids
Sage	Rosmanol, epirosmanol, phenolic acids (rosmarinic acid), phenolic diterpenes (carnosic acid), flavonoids
Sesame seed	Sesaminol, α -tocopherol, sesamol
Turmeric	Curcumin, 4-hydroxycinnamoylmethane
Thyme	Phenolic acids (gallic acid, caffeic acid, rosmarinic acid), thymol, phenolic diterpenes, flavonoids

The next table summarizes the antioxidant compounds isolated from herbs and spices and their mode of action in inhibiting or slowing down oxidation reactions:

Spice/herb	Scientific name	Antioxidant compounds	Mode of action
Rosemary	<i>Rosemarinus officinalis</i>	Carnosol, carnosic acid, rosmanol, rosmadial, diterpenes (epirosmanol, isorosmanol, rosmaridiphenol, rosmariquinone, rosmarinic acid)	Scavenge superoxide radicals, lipid antioxidant and metal chelator
Sage	<i>Salvia officinalis</i> L.	Carnosol, carnosic acid, rosmanol, rosmadial, methyl and ethyl esters of carnosol, rosmarinic acid	Free radical scavenger
Oregano	<i>Origanum vulgare</i>	Rosmarinic acid, caffeic acid, protocatechuic acid, 2-caffeoyloxy-3-[2-(4-hydroxybenzyl)-4,5-dihydroxy] phenylpropionic acid; flavonoids – apigen, eriodictyol, dihydroquercetin, dihydrokaempferol; cavacrol, tymol	Free radical scavenger
Thyme	<i>Thymus vulgaris</i> L.	Thymol, cavacrol, p-Cumene-2,3-diol, phenolic acids (gallic acid, caffeic acid, rosmarinic acid), phenolic diterpenes, flavonoids	Free radical scavenger
Ginger	<i>Zingiber officinale</i>	Gingerol, shogaol, zingerone	Free radical scavenger
Turmeric	<i>Curcuma domestica</i> L.	Curcumins, 4-hydroxycinnamoyl methane	Free radical scavenger
Black pepper	<i>Piper nigrum</i> L.	Kaempferol, rhamnetin, quercetin	Free radical scavenger

Spice/herb	Scientific name	Antioxidant compounds	Mode of action
Chili pepper	<i>Capsicum frutescence</i> L.	Capsaicin, capsaicinol	Free radical scavenger
Clove	<i>Eugenia caryophyllata</i>	Phenolic acids (gallic acid), flavonol glucosides, phenolic volatile oils (eugenol, acetyl eugenol, isoeugenol), tannins	Free radical scavenger, metal chelator
Marjoram	<i>Majorana hortensis</i>	Beta-carotene, beta-sitosterol, caffeic-acid, carvacrol, eugenol, hydroquinone, linalool-acetate plant 3–17, myrcene, rosmarinic-acid, terpinen-4-ol	Free radical scavenger
Cumin	<i>Cuminum cymimum</i>	Cuminal, γ -terpinene, pinocarveol, linalool, 1-methyl-2-(1-methylethyl)benzene, carotol	Free radical scavenger, metal chelator

5.2. SPICES AND CULINARY HERBS AS SALT ALTERNATIVES

Salt is the commonly used name for sodium chloride, which consists of 40% sodium and 60% chloride. Salt provides about 90% of the sodium in the human diet. Sodium is essential for the maintenance of cellular membrane potential and the absorption of nutrients in the small intestine. Furthermore, its presence determines the volume of extracellular fluid, thereby maintaining blood volume and blood pressure. However, excessive consumption of sodium has been associated with negative health effects, the most alarming being elevated blood pressure. Hypertension is a major risk factor for cardiovascular disease, the leading cause of death worldwide. It accounts for 62% of strokes and 49% of coronary heart disease. Strongly associated with diseases of cardiovascular disorders, high salt intake causes high blood pressure increasing the risk of stroke, stomach cancer, left ventricular hypertrophy and kidney disease, and obesity (Grace, 2013), the moderation of consumption or its replacement by other healthy elements is a fundamental step, either for prevention or for treatment. The solid salt consumption further increases problems in the health status of the

older population, since, with the stretch of age, renal function loses effectiveness, and excretion of excess sodium becomes reduced (Gomes, 2012). In this regard, prevention becomes fundamental.

In industrial countries, about 75–80% of dietary salt is obtained through processed food consumption, 5–10% is naturally occurring in the foods that make up the diet and the remaining 10–15% comes from salt added during cooking or at the table. The salt is used in a major variety of products, usually in small amounts, which makes the quantification of its consumption very unconscious. Among the functions of salt is the function of palatability. In addition to impart a salty taste to a food to which is added, the salt may also enhance other flavors and suppress the bitter taste. It has, furthermore, the natural food preservative function, being efficient and economical. With regard to processing, the salt influences also the texture of foods such as cheese or meat and to modify the physical properties as turn the meat tender.

The World Health Organization (WHO) has already come to question and raise awareness to the excessive consumption of salt in many countries, particularly European ones, where the average salt intake for adults is 10.7 g/day, an amount that significantly exceeds the 5 g/day recommended as maximum (Lopes et al., 2014). The WHO 2013-2020 Action Plan in the field of Food and Nutrition suggests reduction strategies for salt intake as one of the best approaches. In recent years, significant steps were taken in providing information and awareness to the consumer, having changed, too, the availability of products with high salt content, particularly in public places (Grace, 2013). The reduction of salt content of foods can, however, have a negative influence in acceptance by consumers and hence sales of the food industry. This entails, therefore, the adjustments by the industry, so as to maintain the quality of product acceptance by consumers and food processing facility (Gomes, 2012).

One of the excellent properties associated to spices and culinary herbs is their distinctive flavor that can replace elements that we use daily in the kitchen, but whose consumption is substantially detrimental to health. There are several studies that show the importance of the inclusion of spices and herbs in food as a great salt substitute, technically known as sodium chloride (Lopes et al, 2014; Gomes, 2012; Grace, 2013). Due to their nutritional composition and the health benefits, spices and herbs not only provide more refined palate, soft and fresh with meals, as well as color and aroma.

Therefore, in order to enhance the taste of food, without adding salt, we may substitute it with natural herbs and spices. These can act as salt alternatives or salt substitutes. Herbs and spices like pepper,

garlic, ginger, basil and cardamom have the ability to transform a simple dish into a sensuous eating experience of lively and refreshing flavors.

Examples of how to use Spices and Culinary Herbs instead of salt

Start with small amounts:

Garlic Powder: Use in meats, poultry, fish, vegetables, salads, soups, and stews.

Ginger: Use in soups, salads, vegetables, and meats.

Lemongrass: Use in soups, stews, meats, poultry, seafood, and sauces.

Marjoram: Use in soups, salads, vegetables, beef, fish, and poultry.

Nutmeg: Use in vegetables and meats.

Onion Powder/Green Onion: Use in meats, poultry, seafood, soups, and salads.

Oregano: Use in soups, salads, vegetables, meats, and poultry.

Paprika: Use in meats, fish, poultry, and vegetables.

Parsley: Use in salads, vegetables, fish, and meats.

Rosemary: Use in salads, vegetables, fish, and meats.

Saffron: Use in breads, snacks, soups, stews, poultry, seafood, sauces, and rice.

Sage: Use in soups, salads, vegetables, meats, and poultry.

Tamarind: Use in soups, poultry, sauces, and rice.

Thyme: Use in salads, vegetables, fish, and poultry.

Vinegar: Use in soups, salads, vegetables, meats, and poultry.

Allspice: Use in meats, fish, poultry, soups, stews, and desserts.

Anise: Use in breads, snacks, soups, stews, vegetables, meats, and poultry.

Annatto Seeds: Use in vegetables, meats, poultry, and rice.

Bay Leaf: Use in soups, stews, meats, poultry, seafood, and sauces.

Basil: Use in soups, salads, vegetables, fish, and meats.

Cayenne Pepper: Use in meats, poultry, stews, and sauces.

Celery Seed: Use in fish, salads, dressings, and vegetables.

Chili Powder/Chile Pequeño: Use in meats, poultry, vegetable, fish and stews.

Cilantro: Use in meats, sauces, stews, and rice. Cinnamon: Use in salads, vegetables, breads, and snacks.

Clove: Use in soups, salads, and vegetables.

Cumin: Use in meats and poultry.

Curry Powder: Use in meats, shellfish, and vegetables.

Dill Weed and Dill Seed: Use in fish, soups, salads, and vegetables.

Garlic: Use in soups, stews, salads, vegetables, meats, poultry, seafood, and sauces.

References

<http://naturalhealthperspective.com/food/spices.html>

Tapsell LC, Hemphill I, Cobiac L, Patch CS, Sullivan DR, Fenech M, Roodenrys S, Keogh JB, Clifton PM, Williams PG, Fazio VA and Inge KE. 2006. Health benefits of herbs and spices: the past, the present, the future. *Med J Aust.*; 185:S4-24.

Low Dog T. 2006. A reason to season: the therapeutic benefits of spices and culinary herbs. *Explore (NY).*; 2:446-9.