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Plants as potent nutraceuticals

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Huge shifts in lifestyle, eating habits, and rural habitations have a big impact on diets in emerging nations, which increases the prevalence of many health issues. The demand from consumers for food products with desired health advantages keeps rising as healthcare costs continue to rise. In addition, people prefer to consume foods that provide the required health benefits against taking medications separately. Natural bioactive chemical substances known as "nutraceuticals," also known as "phytochemicals," have therapeutic, disease-prevention, or health-promoting qualities. Nutraceuticals can include processed goods, genetically modified "designer" meals, herbal products, nutritional supplements, and diets in addition to isolated nutrients.

For generations, people have used herbs as food and medicine. Herbs have been a valuable element of society since the dawn of human civilisation, valued for both its culinary and therapeutic qualities. Herbs have contributed significantly to preserving human health, enhancing human existence, and providing us with useful ingredients for seasoning, beverages, cosmetics, colours, and medications. Since 1960, there has been a rise in interest in "natural health" and the usage of herbal products. People who seek conventional treatment frequently use herbal bioactives, a significant category of nutraceuticals. Flavonoids, terpenoids, lignans, sulphides, polyphenols, carotenoids, coumarins, saponins, plant sterols, uramins, and phthalates are just a few of the active phytochemicals found in herbs.

Eg. Asparagus racemosus, Withania somnifera, Bacopa monniera, Pueraria tuberose, Emblica officinalis, Terminalia chebula, Terminalia belerica, Terminalia arjuna and Aloe vera.

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Common bioactive ingredients in herbs

Alkaloids

The pharmaceutical industry uses natural plant alkaloids to create drugs that are antimalarial (quinine and chloroquinine), anticancer (taxol, vinblastine, and vincristine), and agents that improve blood flow to the brain (vincamine). The most popular is the established practise of adding quinine as a bitter to tonic water. Black tea contains theophylline, which is a significant component, and coffee contains caffeine, which is well known for having pharmacological activity. Both of these substances are now frequent in our daily lives.

Anthraquinones

An extensive class of chemicals with a variety of biological properties is represented by anthraquinones. They have a laxative effect because they stimulate the muscles in the large intestine to contract. Herbs such as dock (*Rumex crispus*), cascara (*Rhamnus purshianus*), senna (*Senna alexandrina*), rhubarb (*Rheum palmatum*) and aloe (*Aloe barbadensis* Miller) contain anthraquinones.

Bitters

Bitters are a mixed group of bitter-tasting compounds found in many naturally occurring herbs. Some common herbs containing bitter compounds are angelica (*Angelica archangelica*), chamomile (*Matricaria chamomilla*), dandelion (*Taraxacum*), goldenseal (*Hydrastis canadensis*), horehound (*Marrubium vulgare*), milk thistle (*Silybum marianum*), peppermint (*Mentha piperita*), rue (Ruta), wormwood (*Artemisia absinthium*) and yarrow (*Achilles millefolium*). Bitter substances primarily influence the digestive system, causing the stomach to secrete digestive juices and enzymes and the liver to release bile. They promote vitamin absorption from food as well as digestion and appetite.

Flavonoids

Flavonoids are primarily present as glycosides in nature and represent a major group of natural antioxidants. Herbs (*Sophora japonica, Citrus grandis and Hypericum perforatum*), fruits (e.g., orange, grapefruit, apple, and grape), vegetables (e.g., onion, kale, broccoli, green pepper, spinach, and tomato) and soybeans are the major sources of flavonoids(Chao et al., 2002). Flavonoids posses beneficial pharmacological effects including protective role against coronary heart diseases and also show anti-allergic, antiviral anticancer as well as antioxidant properties.

Saponins

Herbs contain steroid saponins, which are responsible for their health-promoting qualities, which are naturally occurring surface-active glycosides generated by plants.

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Capsicum peppers (*Capsicum annuum*), aubergine (*Solanum aethiopicum* L.), fenugreek (*Trigonella foenum graecum* L.), yucca (*Yucca schidigera*) and ginseng (*Panax ginseng*) are examples of some common herbs that contain steroid saponins.

Tannins

Tannins are a class of complex phenol and polyphenol substances that function as astringents, compressing structural proteins in the skin and mucosa and shrinking tissues. Tannins have the capacity to inhibit the production of superoxide and free radicals as well as lipid peroxidation. Tannins exhibit several beneficial health properties such as anti-inflammatory antimicrobial antileishmanial, immunomodulatory, neuroprotective, antihypertensive and antidiarrhoeal activities and are also useful in treatment of ulcerative colitis.

Table 1. Common herbs as nutraceuticals

Common name	Biological name	Constituent	Health benefits
Garlic	Dried bulbs of *Allium sativum* (Liliaceae).	Alliin and allicin	Anti-inflammatory, antibacterial, antigout, nervine tonic
Maiden hair tree	Leaves of *Ginkgo biloba* (Ginkgoaceae).	Ginkgolide and bilobalide	PAF antagonist, memory enhancer, antioxidant
Ginger	Rhizomes of *Zingiber officinale* (Zingiberaceae.)	Zingiberene and gingerols	Stimulant, chronic bronchitis, hyperglycemia and throat ache
Echinacea	Dried herb of *Echinacea purpurea* (Asteraceae)	Alkylamide and echinacoside	Anti-inflammatory, immunomodulator, antiviral
Ginseng	Dried root of *Panax ginseng* (Araliaceae)	Ginsenosides and Panaxosides	Stimulating immune and nervous system and adaptogenic properties
Liquorice	Dried root of *Glycyrrhiza glabra* (leguminosae)	Glycyrrhizin and liquirtin	Anti-inflammatory and Anti-Allergic, Expectorant
St. John's wort	Dried aerial part of *Hypericum perforatum* (Hypericaceae)	Hypericin and hyperforin	Antidepressant, against HIV and hepatitis-c virus
Turmeric	Rhizome of *Curcuma longa* (Zingiberacae)	Curcumin	Anti-inflammatory, antiarthritic, anticancer and antiseptic
Onion	Dried bulb of *Allium cepa* Linn. (Liliaceae)	Allicin and alliin	Hypoglycemic activity, Antibiotic and antiatherosclerosis
Valeriana	Dried root of *Valeriana officinalis* Linn. (Valerianaceae)	Valerenic acid and valerate	Tranquillizer, migraine and menstrual pain, intestinal cramps, bronchial spasm
Aloes	Dried juice of leaves *Aloe barbadensis* Mill. (Liliaceae)	Aloins and aloesin	Dilates capillaries, anti-inflammatory, emollient, wound healing properties
Goldenseal	Dried root of *Hydrastis Canadensis.* (Ranunculaceae)	Hydrastine and berberine	Antimicrobial, astringent, antihemorrhagic, treatment of mucosal inflammation
Senna	Dried leaves of *Cassia*	Sennosides	Purgative

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	angustifolia (Leguminosae)		
Asafoetida	Oleo gum resin of *Ferula assafoetida* L. (Umbelliferae)	Ferulic acid and umbellic acid	Stimulant, carminative, expectorant
Bael	Unripe fruits of Aegle marmelos Corr. (Rutaceae)	Marmelosin	Digestive, appetizer, treatment of diarrhea and dysentery
Brahmi	Herbs of Centella asiatica (Umbelliferae)	Asiaticoside and madecassoside	Nervine tonic, spasmolytic, anti-anxiety

Conclusion

Research on the functionality of herbal components, their toxicity, and their usage in food items has recently attracted attention. These herbal nutraceuticals are being included into food products by food makers in methods that do not compromise the products' aesthetic qualities. When consumed within the appropriate Recommended Dietary Intakes, nutraceuticals have been shown to have positive effects on health and can help people stay healthy in general. Although nutraceuticals show great promise in promoting human health and preventing disease, regulatory toxicologists, health professionals, and nutritionists should strategically collaborate to plan appropriate regulation to provide the greatest possible health and therapeutic benefit to humanity.